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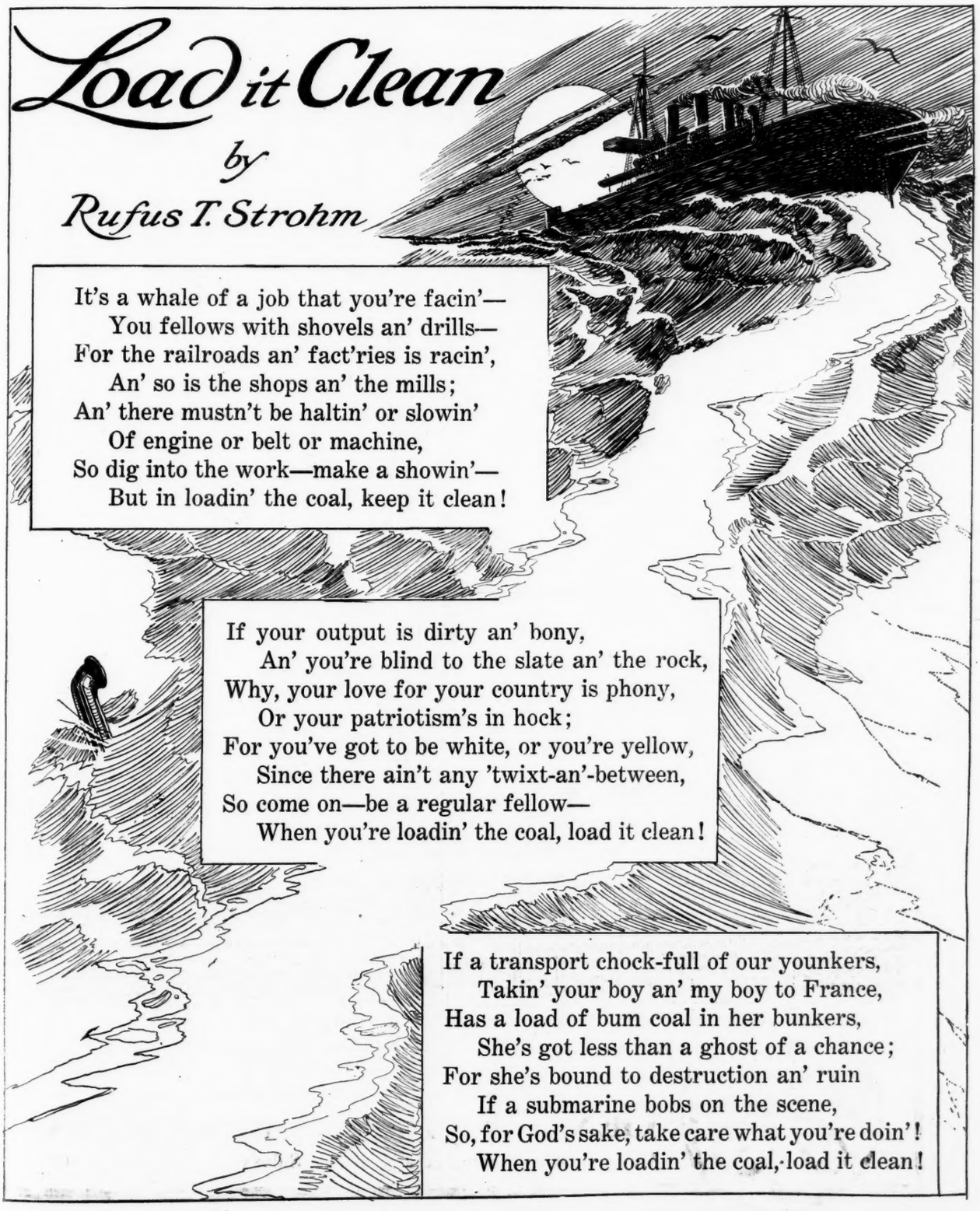


Load it Clean

by

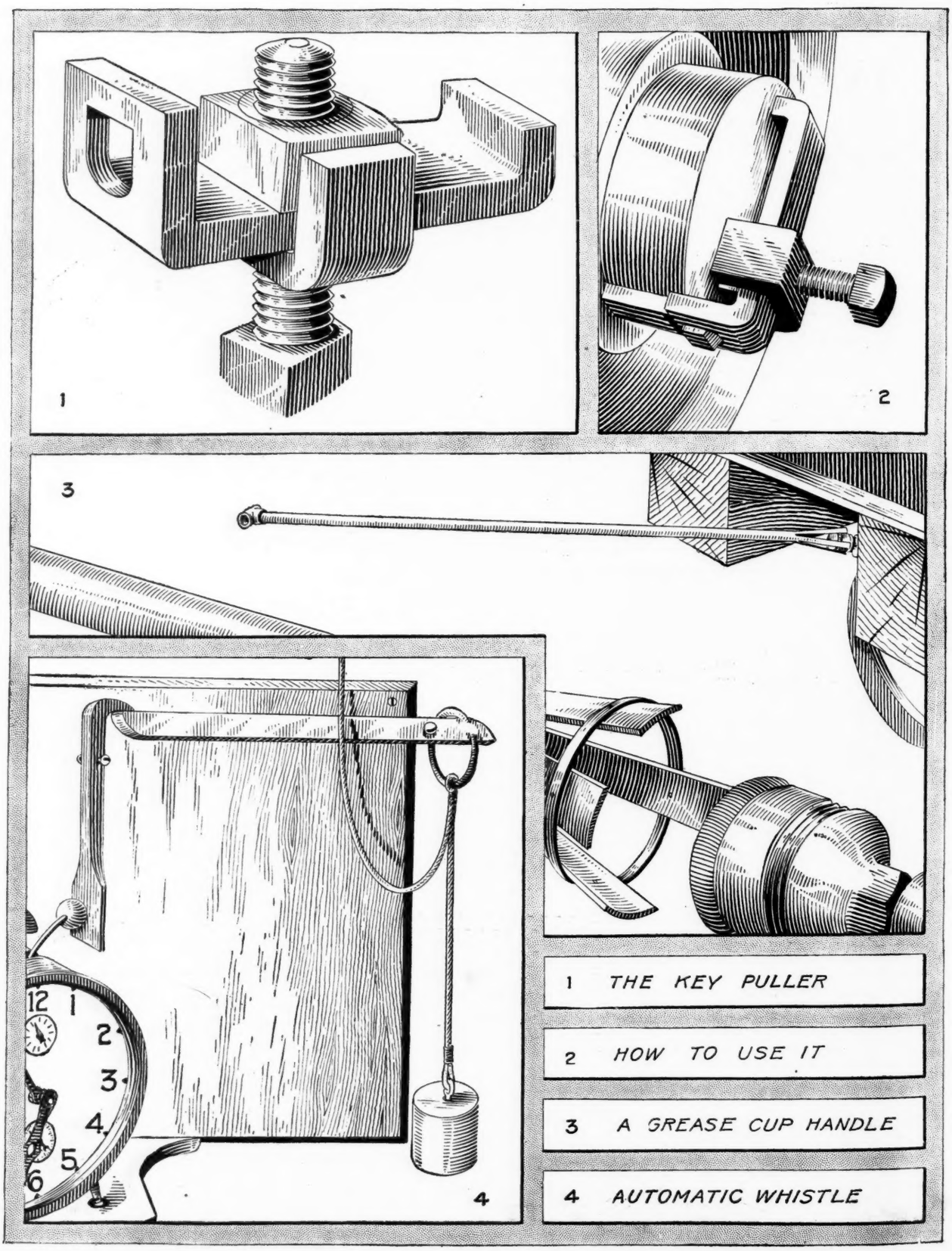
Rufus T. Strohm

It's a whale of a job that you're facin'—
You fellows with shovels an' drills—
For the railroads an' fact'ries is racin',
An' so is the shops an' the mills;
An' there mustn't be haltin' or slowin'
Of engine or belt or machine,
So dig into the work—make a showin'—
But in loadin' the coal, keep it clean!

If your output is dirty an' bony,
An' you're blind to the slate an' the rock,
Why, your love for your country is phony,
Or your patriotism's in hock;
For you've got to be white, or you're yellow,
Since there ain't any 'twixt-an'-between,
So come on—be a regular fellow—
When you're loadin' the coal, load it clean!

If a transport chock-full of our younkers,
Takin' your boy an' my boy to France,
Has a load of bum coal in her bunkers,
She's got less than a ghost of a chance;
For she's bound to destruction an' ruin
If a submarine bobs on the scene,
So, for God's sake, take care what you're doin'!
When you're loadin' the coal, load it clean!

Some Ideas and Suggestions That Have



Proved Their Utility Around the Mine

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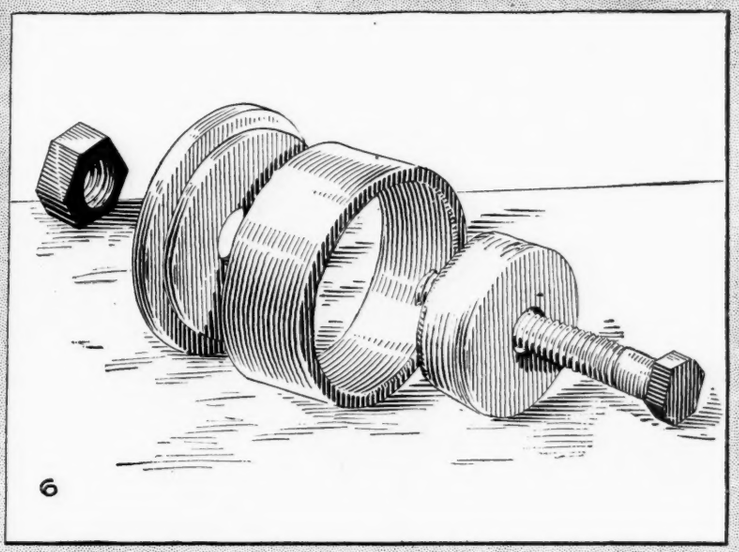

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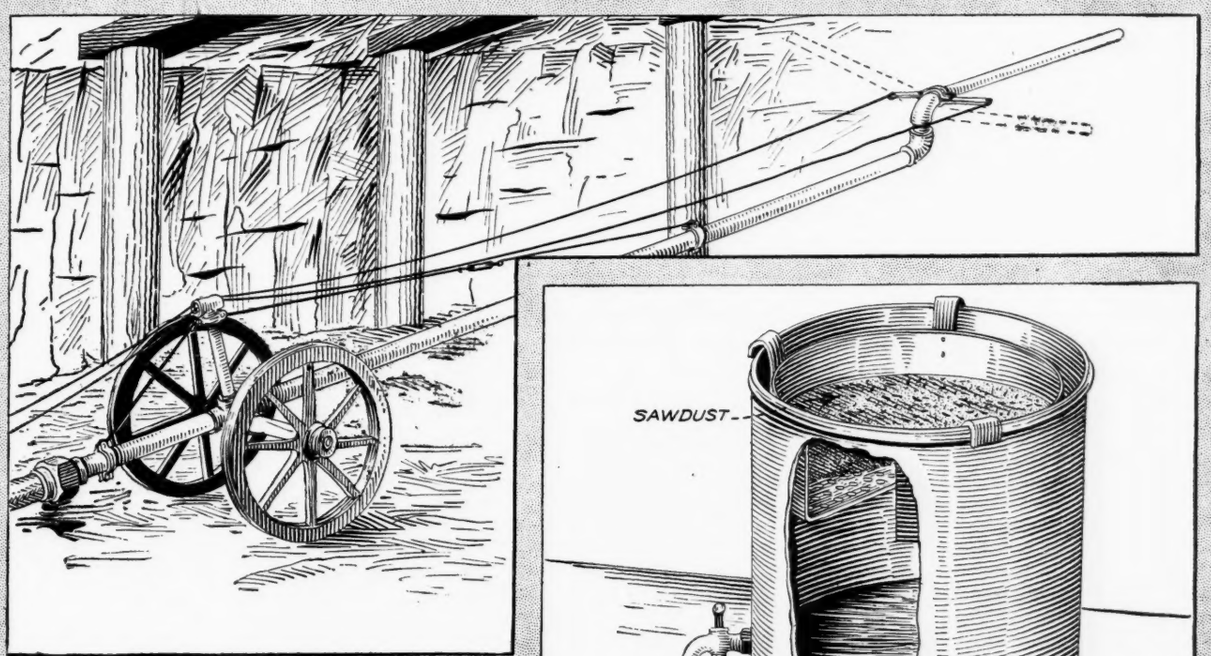

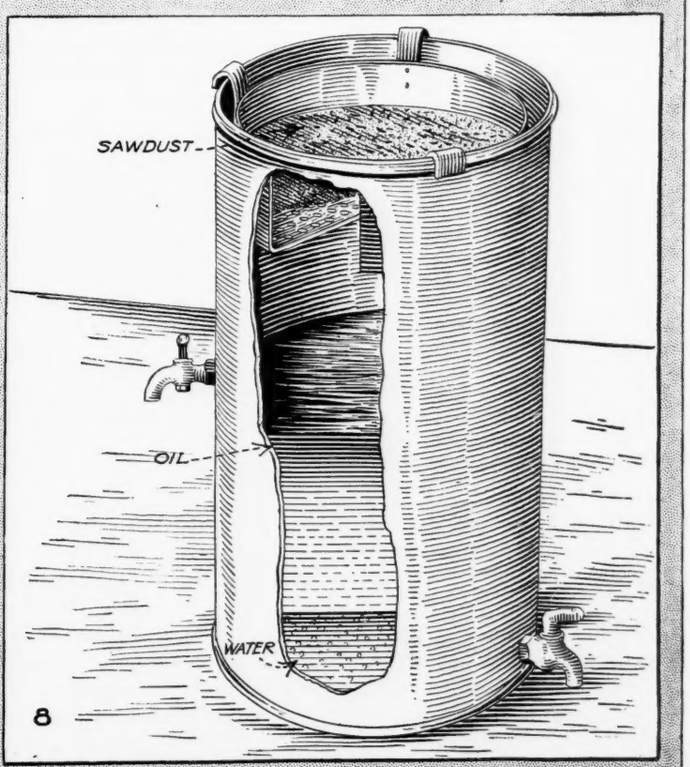

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5 LEATHER CUPPER

6 ITS COMPONENT PARTS

7 FIRE HOSE EXTENSION

8 SAW DUST OIL FILTER

Hoisting Water in Tanks by Electricity

By GEORGE W. HARRIS
Editorial Staff, "Coal Age"

"OLD COMPANY'S LEHIGH" for many years has been favorably known the length and breadth of the land wherever anthracite coal has been prized as a domestic and steam fuel. The main source of this coal is the Panther Creek Valley, adjoining the eastern end of which is the celebrated mine at Summit Hill where the old workings long have been burning and destroying thousands of tons of "Big Vein" coal. Mauch Chunk, Penn., is not far distant, and tourists visiting this old town, in the midst of the "Switzerland of America," generally went to this burning mine, which is on a site overlooking the Panther Creek Valley. A few years ago the fire in this old colliery was isolated by building a barrier pillar shutting off the old workings from the main body of coal adjoining. The old town of Tamaqua is at the western end of the Panther Creek or main holdings of the Lehigh Coal and Navigation Company.

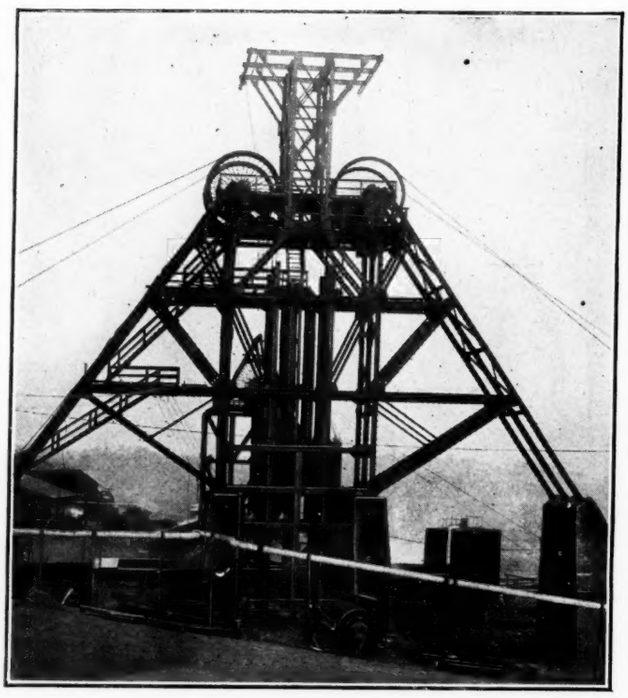


FIG. 1. HEADFRAME AT TAMAQUA COLLIERY

Nearing the century mark of existence, this veteran coal company looks back on many years of achievement. The history of this pioneer organization is most interesting. The original companies, which later were merged into the Lehigh Coal and Navigation Co., were the first coal companies in existence on any scale in the anthracite field. The Lehigh Coal Mining Co. began operations in 1793 and the Lehigh and Navigation Co. was founded in 1818. In 1820 these two companies combined under the name of the Lehigh Coal and Navigation Co., thus establishing its claim to the title of the oldest coal-mining company in existence in the region.

The output of this company in 1917 was about five million tons, or an increase of 31 per cent. over that of the preceding year. Its operations are being enlarged rapidly, and an aggressive policy of expansion and development looks to a substantial increase of tonnage this year over that of 1917—this in the face of a decreasing labor supply and increasing difficulties of operation.

Among the matters of serious import to the Panther Creek operator is the water problem. The steep mountain sides run water quickly to the valley below. In the case of intervening broken surface, on account of mine falls and subsidence of surface, the water is diverted to underground workings. As mining progresses, the difficulties of handling mine water will increase with greater depth and quantity of water to be removed. At times water floods the workings almost beyond the ability of equipment to handle it. The water drainage gangway alone carried 40,000 gal. per min. in one instance during a wet season.

In the early '80's, hoisting water from the mines by tanks was started by the Lehigh Coal and Navigation Co., and during the succeeding years this method has been given a thorough trial. Coaldale No. 8 and Lansford No. 6 shafts are the oldest water hoists in the Panther Creek Valley and likely the first installations of the kind in the anthracite region. Coaldale No. 9 shaft has no headframe, the water being discharged into a water level tunnel below the surface. The two steam water hoists at shaft No. 10 of the Greenwood colliery have a single wooden headframe, common to both hoists, equipped with a unique water seal equipment which will be treated in a separate article. Lansford No. 4 and No. 6 water hoists and the two water hoists at No. 14 shaft, Tamaqua colliery, all have steel headframes. The No. 14 shaft hoists include a steam and an electric motive power; the latter was installed a year or so ago and is worthy of special note.

The water hoists enumerated total eight. In addition each shaft through which coal is hoisted is so arranged that tanks can be installed at once in an emergency. The false bottom of 3-in. plank which rests on shaft timbers about 4 or 5 ft. below the cage landing at the bottom can readily be removed; a 30-ft. sump is thereby available in which water tanks can be filled. When the false bottom is in position it tends to keep mine cars or other large objects which fall into the pit from going to the bottom of the sump.

At Nos. 4, 6, 10 and 14 shafts the water hoisted to the surface is spilled into reservoirs from which the water runs by gravity to the respective breakers. At other breakers the creek water must be used. The wet preparation of anthracite coal necessitates the use of large quantities of water. For every 1000 tons of coal prepared, practically 1000 gal. of water are required per minute. Possibly about the only good word a coal operator will have for mine water is in this connection. In very dry seasons or during an extremely cold winter water for breakers and boilers may be a most serious matter. In portions of the anthracite region during the past winter the water in some colliery reservoirs froze

to such a depth that driven wells were substituted to supply the requisite water for certain operations.

At shaft No. 14, of the Tamaqua colliery, there is a steam-operated hoist and another one operated by electric power; the latter hoist has been in operation almost two years. The plan of Tamaqua colliery is shown in Fig. 2, and a section of the basin at shaft No. 14 is given in Fig. 3.

Tamaqua colliery adjoins the town of Tamaqua and is situated in Schuylkill County, Pennsylvania. The seams at this point were developed by shafts from which tunnels were driven to intersect the various beds at different levels. The water shaft No. 14 (*A*) and the coal shaft (*B*) were both started about the same time in 1906. Shaft *A* was sunk to a depth of 826 ft. and a short tunnel driven from the bottom to serve as a sump. Other tunnels were driven as shown on the section and map—also several shafts for various purposes. Three levels were opened up from the main shafts at depths of about 406, 589 and 829 ft. respectively, below the surface. These tunnels mainly developed the coal seams on the south dip. The second level tunnel constituted the principal development; it was extended to cut all seams in Locust Mountain on the north, a distance of 2160 ft.; on the south, this tunnel was driven a distance of 4300 ft. from shaft *A* to reach the seams in Sharp Mountain. Seven seams are worked on 2nd level north —the Sandrock, Top, Middle and Bottom splits of the Mammoth, the Seven-foot and the Buck Mountain beds. On the 2nd level south, the Orchard, Primrose, Top and Bottom splits of the Mammoth and the Buck Mountain seams are mined.

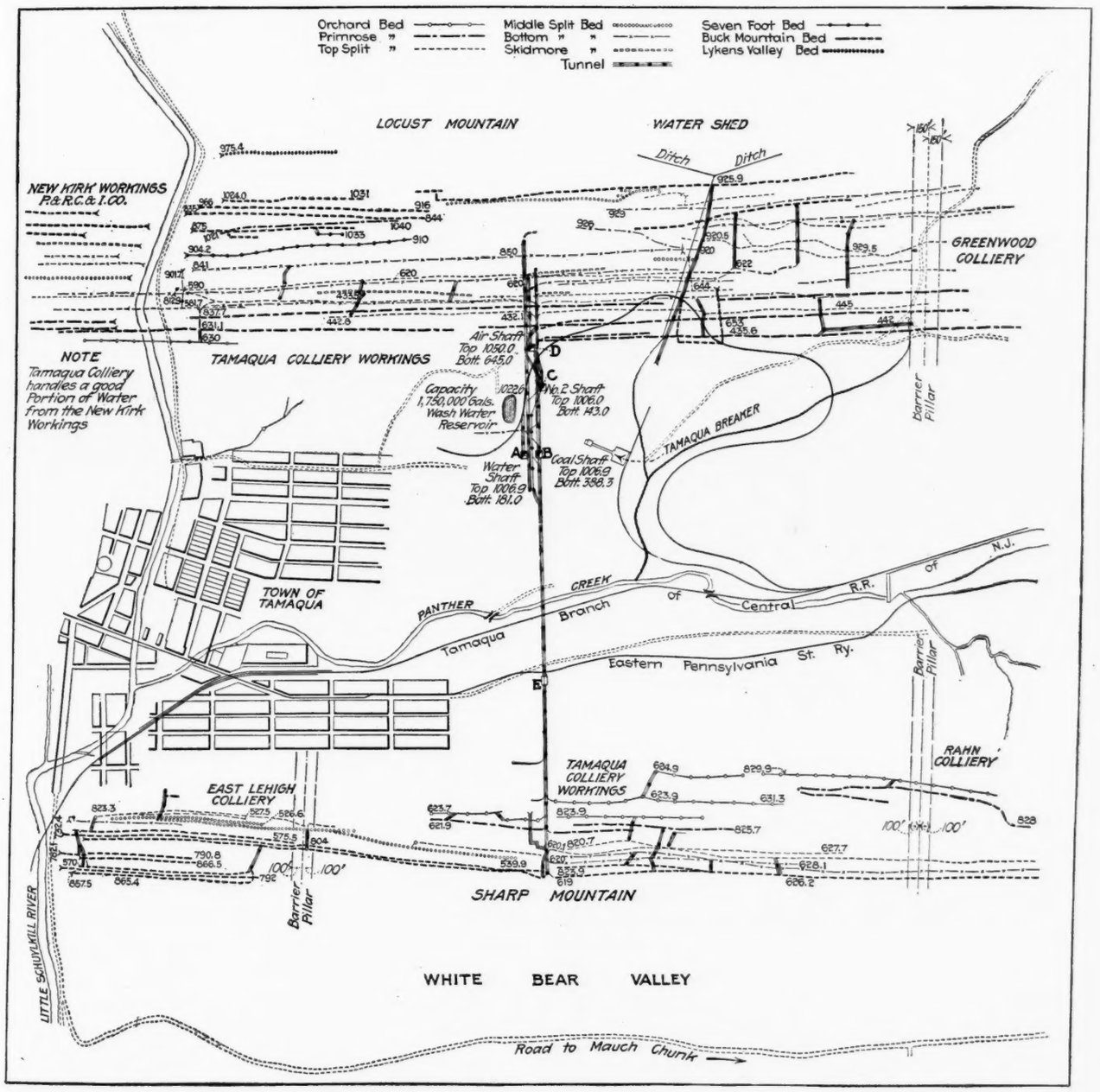


FIG. 2. GANGWAYS, TUNNELS, SHAFTS AND SURFACE FEATURES OF TAMAQUA COLLIERY

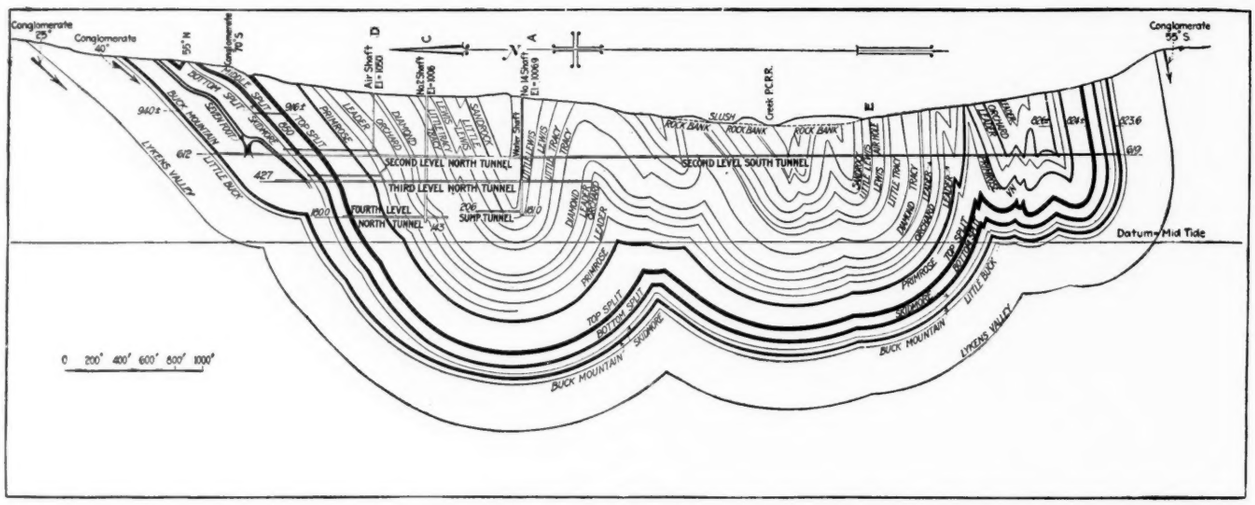


FIG. 3. CROSS-SECTION OF BASIN AT WATER SHAFT AT TAMAQUA COLLIERY

Development to the east and west of the main or 2nd level is as follows: The south tunnel workings extend 3400 ft. east to a barrier pillar between Tamaqua and Rahn collieries, and 2400 ft. west to a barrier pillar between Tamaqua and East Lehigh collieries. The north tunnel workings extend 3600 ft. east to a barrier pillar between Tamaqua and Greenwood collieries, and 3800 ft. west to Little Schuylkill River, the center of which is the dividing line between the Lehigh Coal and Navigation Co. and the Philadelphia & Reading Coal and Iron Co. at the latter's New Kirk old workings. Limited mining in the Primrose seam was carried on during early times and abandoned in 1874. Thus it is seen that a large amount of territory has been opened up. As to the drainage area, the situation can readily be grasped by reference to the map and section. From the top of Sharp Mountain on the south, extending over the adjoining mine workings, there is a drainage area of about 110 acres on the Tamaqua colliery tract. Similarly on the north, Locust Mountain furnishes a drainage area of about 240 acres. Between these two areas, in the center of the valley, the water drains into Panther Creek, which flows into Little Schuylkill River at Tamaqua.

It can readily be seen that considerable water will find its way into the workings of the Tamaqua colliery in wet weather. Conditions are somewhat improved on a portion of the Locust Mountain water shed by ditches above the outcrops. These ditches catch water running down the mountain slope above and divert it to a trough which carries it over the workings to Panther Creek. Underground, the bulk of the water at Tamaqua col-

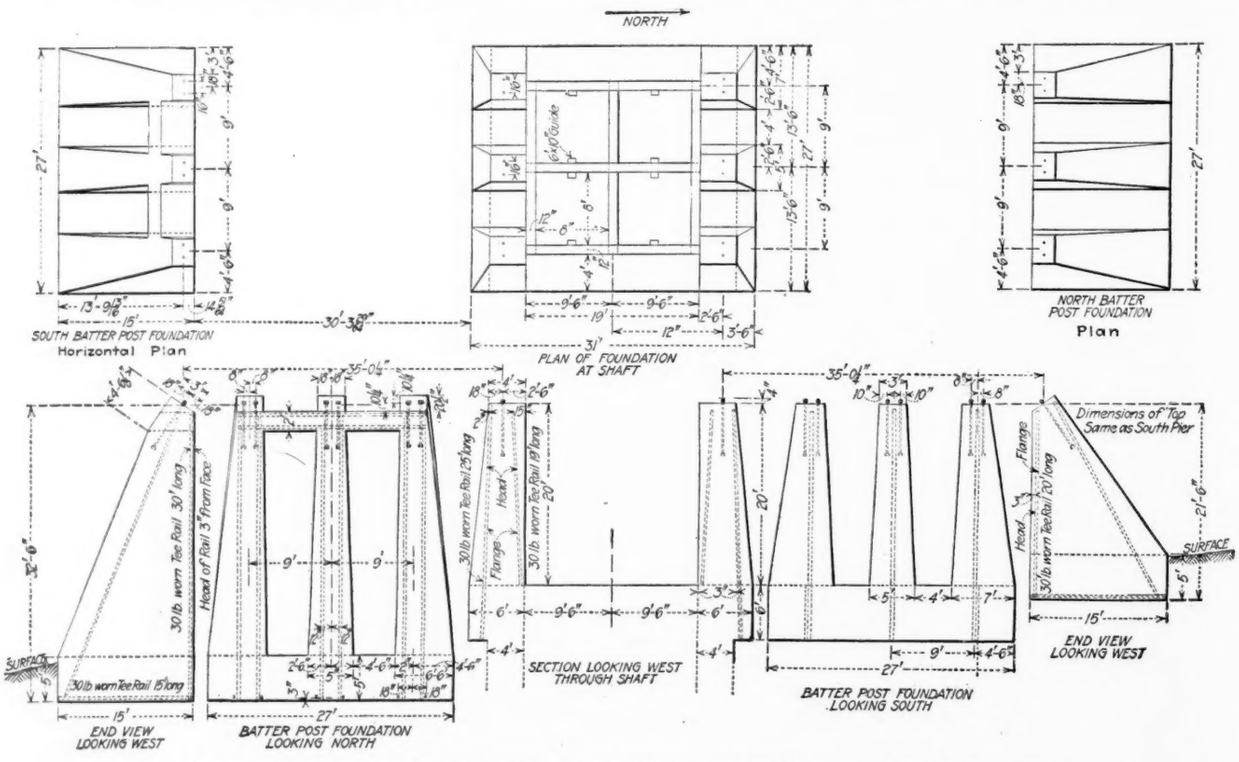
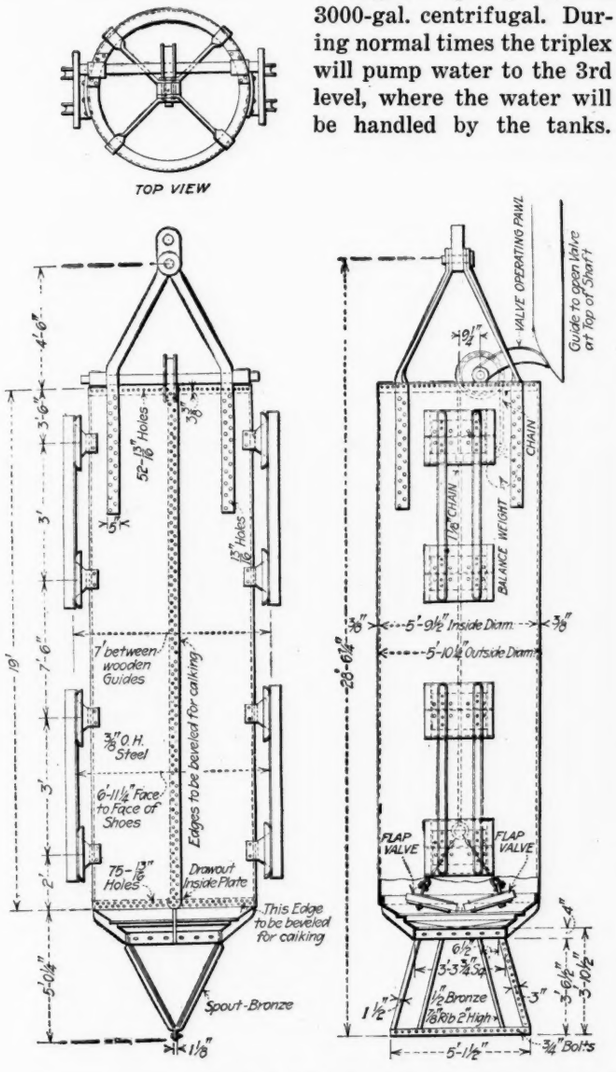

NORTH
SOUTH BATTER POST FOUNDATION
Horizontal Plan
PLAN OF FOUNDATION AT SHAFT
NORTH BATTER POST FOUNDATION
Plan
30 lb. worn Tee Rail 30' long
Head of Rail 3' from Face
30 lb worn Tee Rail 15' long
END VIEW LOOKING WEST
BATTER POST FOUNDATION LOOKING NORTH
30 lb worn Tee Rail 25' long
30 lb worn Tee Rail 19' long
SECTION LOOKING WEST THROUGH SHAFT
BATTER POST FOUNDATION LOOKING SOUTH
Dimensions of Top Same as South Pier
30 lb worn Tee Rail 20' long
END VIEW LOOKING WEST
SURFACE

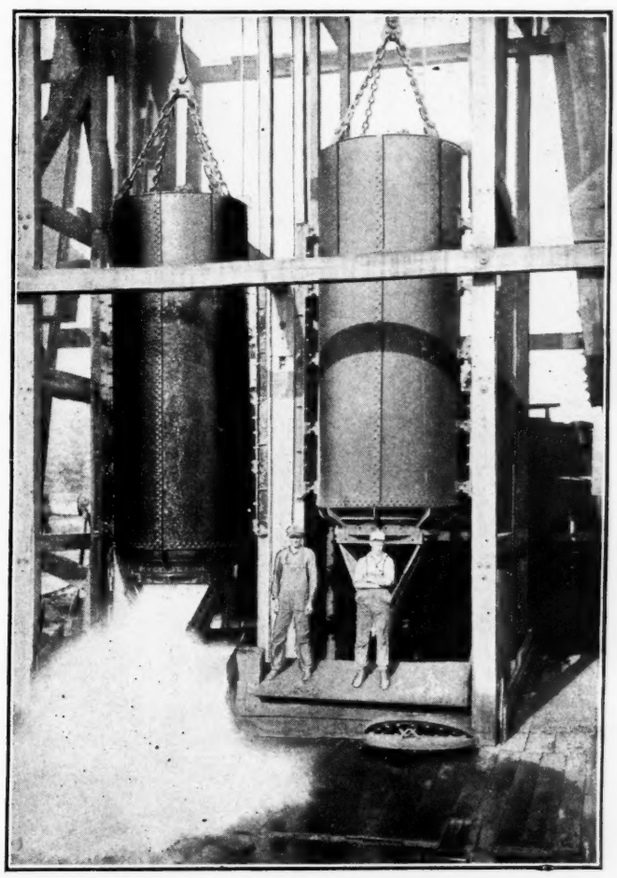
FIG. 4. DETAILS OF HEADFRAME FOUNDATIONS AT SHAFT NO. 14 WATER HOIST

liery is handled by the water hoists at shaft No. 14 during normal times. In the south tunnel a 2000-gal. centrifugal pump is now being placed which will be used in wet weather to pump water up a 300-ft. columnway to the surface. Ordinarily this water will run to the water shaft. On the 4th level now being developed at shaft No. 2 there will be installed a triplex pump of 1500-gal. capacity and a 3000-gal. centrifugal. During normal times the triplex will pump water to the 3rd level, where the water will be handled by the tanks.



provided underground at each of the several levels so that all coal is hoisted through the two-compartment coal shaft near the water hoist. The coal shaft compartments are each 7 x 11 ft. in dimension. Tamaqua colliery now produces about 2000 tons of coal daily.

Among the various water hoists of the Lehigh Coal and Navigation Co. perhaps the most interesting installation and the one most deserving of special note is the twin hoist at shaft No. 14. The headframe at this shaft is shown in Fig. 1 and the details of the foundations are given in Fig. 4. An interesting proposition developed in connection with the foundations. Two sets of plans were prepared showing concrete piers for the headframe; one set called for piers 10 ft. high and in



FIGS. 5 AND 6. DETAILS OF WATER TANKS AND VIEW OF TANKS AT SHAFT

But in wet weather when the water shaft plant cannot hoist all the water, the centrifugal will pump direct to the surface.

In 1916 at Tamaqua colliery, 3,374,000 tons of water were hoisted on a production of 343,000 tons of coal, or 9.8 tons of water per ton of coal. The average for all the collieries of the Lehigh Coal and Navigation Co. in the same year was 6.68 tons of water per ton of coal. The removal of water from mines is a fixed charge whether the colliery works or not. The larger the output of coal per year, the less per ton should be the expense of pumping water. In March, 1917, at shaft No. 14, there were hoisted 29,000 tanks or 88,000,000 gal. of water by the electric and steam hoists. Shaft No. 14 has four compartments, each being 8 x 8 ft. in dimension. Connections between the various tunnels are

the other plan they were made 20 ft. in height. It was found on submitting these plans to the steel companies for bids on the headframe that the plan calling for piers 20 ft. high was the cheaper proposition. The cost of the extra 10 ft. of concrete was considerably less than the cost of the same height of steel work. This was the reason for making the piers as high as they are—the situation is clearly shown in Fig. 1.

The headframe foundations at the shaft were placed on the shaft lining, which is about 4 ft. thick all the way down to rock—a distance of some 30 ft. The concrete is a 2:4:6 mixture and is reinforced by old 30-lb. tee rail. Everything connected with these water hoists should be of especially heavy and substantial construction. The electric hoist tank weighs 8½ tons empty and has a capacity of 3600 gal., which adds 15

tons of water, and brings the load to be hoisted up to 23½ tons irrespective of the weight of the hoisting rope. The duty on the hoist is somewhat less as the tanks are in balance.

The steel headframe is shown in Fig. 1. The sheave wheel shaft is 50 ft. above the top of the concrete foundation, and the center of the shaft compartment, on the electric hoist side, is 125 ft. from the center of the hoist drum. An interesting feature of all the Lehigh Coal and Navigation Co. headframes is the contrivance at the top for handling sheaves, etc. In Fig. 1 it is shown as a steel frame rising between the two sets of sheaves with cross beams at the top carrying I-beam and trolley directly over the center of the sheave shaft. In operation the sheaves are hoisted, when necessary, by a block and tackle, run over by the trolley to clear the headframe and then lowered to the ground. When repairs are to be made, a device of this kind is needed quickly and it is a great labor saver.

The tanks used in handling the water at shaft No. 14 are good servants but dangerous enemies. They each weigh 8½ tons empty and when loaded 23½ tons; should the wire hoisting rope break this heavy mass would gain terrific momentum with any distance to fall. Or if a wooden guide works loose, an accident resulting may put the whole shaft out of commission. Overwinds are practically an impossibility in the case of the electric hoist, but in some other installations where it has occurred the shaft has been idle for a day or so and the tank was ruined.

The details of the tanks are shown in Fig. 5. The flap valve at the bottom of the tank is balanced, so that when the empty tank strikes the water at the sump the valve readily opens and the tank quickly fills. As the tank reaches the top of the shaft, a pawl at the side comes in contact with a guide; the valve is thus opened at the bottom of the tank and is held in that position until the water is discharged. A tank discharging its load is shown in Fig. 6. The spout at the bottom deflects the water to one side. The two men in the illustration serve as a scale and impress one as to the capacity of the tanks. One of the tank flap valves can be seen on the floor below the men in question. The photograph from which Fig. 6 was made illustrates conditions at a water hoist where the headframe is constructed of wood. However, except for the presence of timber work and the absence of the massive concrete foundations of shaft No. 14, it might be taken for the latter installation.

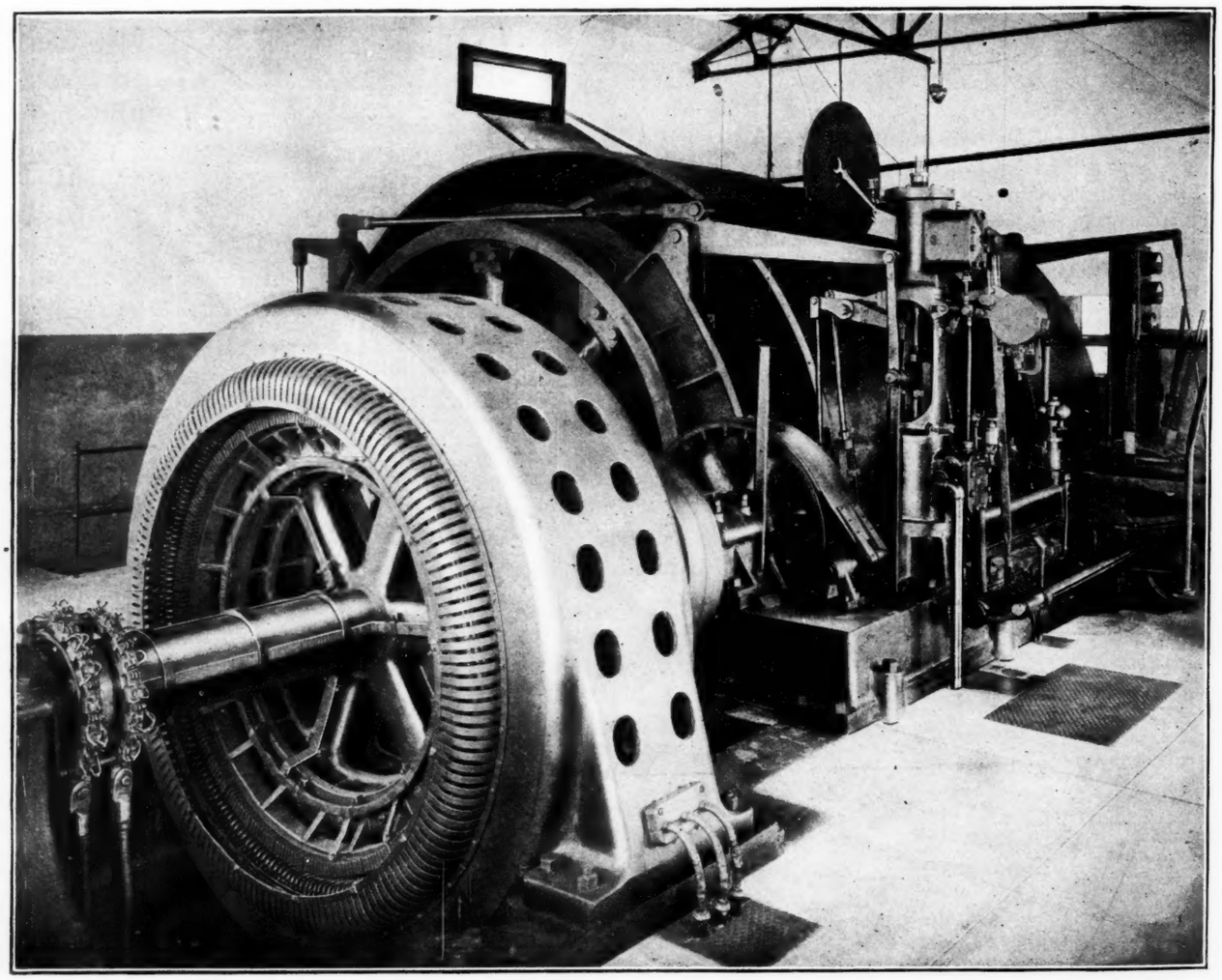


FIG. 7. ELECTRIC WATER HOIST AT SHAFT NO. 14 OF LEHIGH COAL AND NAVIGATION CO.

At the time the headframe foundations (see Fig. 4)

were built at shaft No. 14, provision was also made for handling water as it was discharged from the tanks. These concrete basins, one on either side of the shaft, are shown in Fig. 1; from here the water runs by gravity to a storage reservoir. In the background at the right of Fig. 1 is a water tank built by the W. E. Caldwell Co., of Louisville, Ky. It is a storage reservoir for water for boilers in the vicinity. In commenting on its good qualities, a Lehigh Coal and Navigation Co. official stated that it was painted inside once a year and gave no trouble.

Possibly the point of special interest at shaft No. 14 water hoist is the electrical hoist itself in its substantial building of concrete. Its operation is prac-

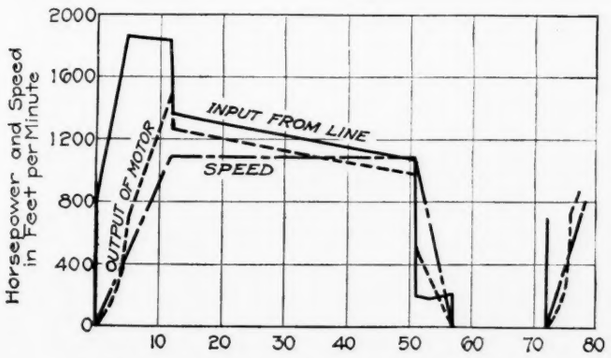


FIG. 8. DUTY CYCLE OF WATER HOIST

tically noiseless, the rush of water as it leaves the tank alone calling attention to the operation of unwatering the mines. With the steam hoists the night silence is broken by the exhaust of the engines, accentuated by the periodical stopping and starting of the hoists.

The electric hoist (see Fig. 7) at shaft No. 14 is a 1200-hp. machine driven by a slip-ring, three-phase, 2200-volt, 25-cycle induction motor. The hoist itself was built by the Vulcan Iron Works, of Wilkes-Barre, Penn., while the electrical end was handled by the General Electric Co., of Schenectady, N. Y. During the proposition stage, before definite plans were settled upon, three methods of driving this hoist were under consideration. One was by means of a flywheel motor generator set (the Ilgner system) and direct-current hoist motor. Another method called for a synchronous motor-generator set and direct-current hoist motor. And a third method by means of a slip-ring induction motor having a polar-wound rotor to permit of the addition of external resistance to the rotor circuit. The third method was the one adopted. Duty cycles of the three methods were made up and calculated, when it was found that so little was to be gained by the use of either of the first two and much more expensive apparatus that the Lehigh Coal and Navigation Co. was justified in deciding in favor of the induction motor.

This motor operates normally at 300 r.p.m. and is controlled by a liquid rheostat and contactors (see Fig. 9) which are used for reversing on the 2200-volt circuit. The hoist itself is driven from the motor by a single herringbone first reduction gear; the motor shaft is connected to the pinion shaft by a flexible coupling. The pinion shaft carries a band brake. The two drums of the hoist are each 12 ft. in diameter and 5 ft. 2 in. between flanges; they are grooved to stow 865 ft. of 2-in. rope with 23 turns. Each drum is provided with a double post brake, the two being controlled from a common compressed-air cylinder. The hoist is, of course, provided with a modern overwinding and over-speeding device. The engineer's platform is directly behind the center of the hoist, the control levers showing plainly in Fig. 7. A striking feature of this powerful hoist is its compactness. The drums would be practically the same whether steam or electric driven. Contrast this induction hoist with its bedplate 12 ft. square and the floor space which would be required for a 1200-hp. steam motive set.

It is particularly interesting to note just how closely a hoist of this nature can be precalculated. Fig. 8 shows the duty cycle which was calculated during the proposition stage of this job, and the duty from which the duty cycle was calculated is as follows:

Depth of shaft	865 ft.	Maximum r.p.m. of drums	38.75
Inclination of shaft to horizontal	90 deg.	Time of acceleration	12 sec.
Weight of bucket (tank)	17,000 lb.	Time of full speed, running	79 sec.
Weight of water in bucket	30,000 lb.	Time of retardation	6 sec.
Size of rope	2 in.	Rest period	15 sec.
Weight of rope per foot	6.25 lb.	Equivalent weight of rotating parts of hoist mechanism at 6 ft. radius	75,000 lb.
Type of drum	Cylindrical		
Maximum rope speed in ft. per min	1,080		

From the duty cycle, the General Electric Co. advised the Lehigh Coal and Navigation Co. that it could guarantee the kilowatt-hours per trip of somewhere in the vicinity of 15.5. After a year's operation of this plant the Lehigh Coal and Navigation Co. divided the total kilowatt-hours consumed by the total number of trips and found that the calculated figure was correct. By inspection of Fig. 8, it can readily be seen that there is an interesting relation between the input from the line, output of motor and speed of the hoist. When power is thrown on, about 800 hp. is instantly developed which in 5 sec. increases to 1850 hp., while the output from the motor is only about 650 hp. During the next 7 sec. the input from the line drops slightly while the output from the motor increases to its maximum of about 1450 hp. Up to this time the speed uniformly accelerates until it reaches 1080 ft. per min. The remainder of the cycle can also be readily followed and requires no special comment. After a rest of 15 sec. the cycle is repeated.

Bird's-eye View of Operations

After close attention to details it often rests the eye and brain to climb to some height and take a bird's-eye view. The main operations of the Lehigh Coal and Navigation Co. are distributed over a valley about 14 miles long by 1½ miles wide at its greatest width. Quite noticeable at a number of points are concrete buildings with red-tile roofs; these are the substations which receive the high-voltage alternating-electric current from the Hauto power plant and convert and transform it to meet local requirements. These substations are the finest of any in the anthracite region.

The Hauto power plant is located on the other side of Locust Mountain in the Nesquehoning Valley, about half a mile west of the Lansford tunnel. It was built in 1909 largely through the efforts and by the financial support of the Lehigh Coal and Navigation Co.; it was recently sold to the Electric Bond and Share Co. Power from this 26,000-kw. station goes to all the plants of the Lehigh Coal and Navigation Co. and also the Bethlehem

Steel Co. and the cement companies in the Lehigh Valley.

The policy of unwatering its mines by water hoists was adopted by the Lehigh Coal and Navigation Co. many years ago. These machines have been efficient and have many points which recommend their continuance. When everything works smoothly, water hoists are satisfactory; but to keep them up to the mark requires considerable inspection of ropes, timber guides, sumps, etc. When the human element enters often too much depends on the personal equation—whether the right man is on the job or not. Of late certain objections to water hoists for local service in the Panther Creek valley have developed. However, this is not a general statement. Whether water hoists should be installed at a mine in another section is a matter for an engineer to investigate and settle on its merits in each case.

The Lehigh Coal and Navigation Co. is a pioneer as regards the introduction of mechanical devices at coal mines—in the last five or six years, especially, it has installed much labor-saving machinery. This company has also conducted many experiments. An account of

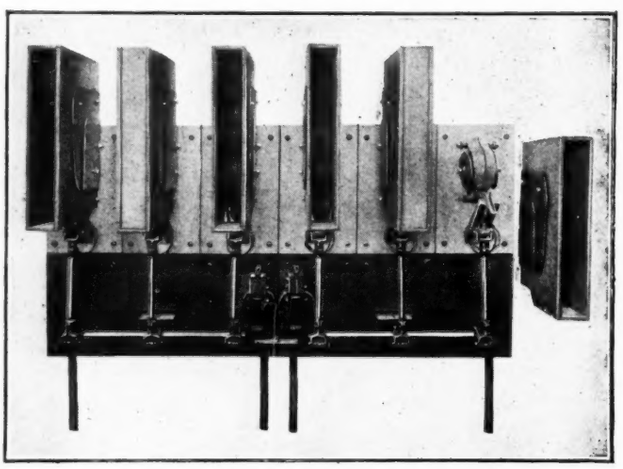


FIG. 9. CONTACTOR PANEL OF WATER HOIST

one of these was read before the American Institute of Mining Engineers and was published in the Mar. 23, 1918, issue of *Coal Age* under the title of "Economy of Electricity Over Steam for Colliery Power Purposes," by R. E. Hobart, Mechanical Superintendent of the Lehigh Coal and Navigation Co. This experiment shows a notable saving effected by the use of electricity over steam in hoisting and pumping at the Rahn colliery. Doubtless this first-hand evidence so strengthened the opinions expressed by other engineers as to the great advantage of electricity, that the Lehigh Coal and Navigation Co. settled on a policy of electrical development. Other changes of policy have also developed as the merits of various devices have become prominent as a result of recent improvements.

In view of the foregoing statement it is not surprising that the Lehigh Coal and Navigation Co. has decided not to continue with the water hoists as in the past. This company considers that water hoists are preferable to steam pumps, but claims that with the conditions at its operations electric pumps do the work better and cheaper than any other method of unwatering its mines.

Low-speed centrifugal pumps have been used at Lansford for four years without repairs—a number of points have been worked out by this company which makes these pumps particularly valuable for its special service. Both steam and electric apparatus have troubles peculiar to each, but the weekly reports of the Lehigh Coal and Navigation Co. show that the electric machines give only half the trouble that steam types do.

The new electric hoist would not have been installed at shaft No. 14 except for the fact of the shaft being ready for it. Furthermore, a steam hoist would have necessitated enlarging the local boiler plant, which would have been inconsistent with an electrical policy. Of course, the water hoists include valuable equipment in engines, etc., and it is not the intention to scrap them and put in pumps at once. They are to be retained to serve the purpose for which they were installed—some of them may be efficient for 10 to 15 years. But in planning for the future and in new development work, it is expected to gradually install electric pumps. Acid mine water does not have the terrors for operators which it did formerly, as it is now overcome by some form of bronze or other acid-resisting metal. Also fine coal and grit, so destructive to the vanes of centrifugals and the valves of triplex pumps, is readily removed by a series of catch basins so that practically clear water runs through the pumps.

From the improvements made in the mechanical end of the coal proposition we might judge that mining was entirely subordinate. As a matter of fact few radical changes have been made in the actual mining of coal for many years. All the developments looking to lowering the cost of coal on cars for shipment are connected with the mechanical end. Better haulage, pumping, undercutting and drilling coal, minimizing breakage from the face to railroad car, all are mainly due to the mechanical engineer. The mining engineer has hardly kept pace with his brother at arms. There are some notable exceptions in the successful treatment of local difficulties, prominent among which are the Lehigh Coal and Navigation Co.'s methods of working its abnormally thick Mammoth seam.

For the assistance given in the gathering of material, both for text and illustrations, used in the preparation of this article, the writer takes great pleasure in acknowledging the courtesy of the officials of the Lehigh Coal and Navigation Co. Also similar thanks are extended to the manufacturers of apparatus described.

Can Dry Coal Without Distillation

Driers are now manufactured which are able to eliminate moisture without distilling any of the volatile combustible matter in the coal; they are fired by hand or with pulverized fuel. The heat first surrounds the shell of the drier, being confined within a chamber where complete combustion takes place; the heated gases are then led through a duct to the discharge end of the drier and enter the inside of the shell at a temperature not exceeding 300 deg. F. This temperature is maintained by the operator and is indicated by a pyrometer. Volatile combustible matter is not likely to be distilled until the temperature rises above 400 deg F.—*H. H. Collins in paper to be presented September, 1918, to American Institute of Mining Engineers.*

Exhaust-Steam Turbine Installations at Coal Mines—II

By E. I. ROBERTS
Cardiff, Alberta

SYNOPSIS—*With an exhaust-pressure turbine it is of course necessary to install a condenser. The choice of condensing equipment depends largely upon local conditions. Surface and jet condensers each have their particular advantages. If the supply of circulating water is not copious, it is sometimes necessary to install either cooling towers or spray ponds.*

WE WILL now consider the means for taking care of the fluctuation of exhaust from the hoist engine, the same considerations will apply to any other units which operate on a fluctuating or intermittent load. If we do not make such a provision, all of the steam above that which the turbine is taking, at the time, will be discharged into the air and wasted; and when the hoist stops running the turbine will then be forced to draw upon live steam to carry the load.

There are two ways of taking care of the steam-quantity fluctuation: One by means of a tank, moving vertically between guides on the gasometer principle, and the other by the absorption of the steam in water in a stationary tank called a regenerator.

In the gasometer method the steam enters the tank at the bottom and at a predetermined back pressure the tank rises. The tank is usually water-sealed and provided with a relief valve, so that if an excess of exhaust steam is made, over and above that taken care of by the gasometer tank, it will exhaust into the air. As the steam quantity becomes less the tank lowers and sends this surplus steam to the turbine. While such tanks are efficient, this method has not yet been used to a great extent on this continent, probably because of its high first cost.

The regenerator method depends on the principle that as the temperature of water is increased over 212 deg. F. it absorbs certain quantities of steam in proportion to the heat increase. The law follows the formula:

$$\text{Quantity of water for storing steam in pounds} = \frac{\text{Total quantity of steam in pounds} \times \text{average latent heat of steam}}{\text{Temperature of steam at highest gage pressure—temperature of steam at lowest gage pressure}}$$

Assuming that the total quantity to be stored is 680 lb. of steam and the highest gage pressure is 4 lb. per square inch and the lowest 0 lb. per square inch, the quantity of water theoretically necessary to store this heat would be 26 tons.

In the Rateau regenerator this intimate mixing of the steam that is necessary for the proper heat absorption is carried on through perforated mixing tubes which extend the full length of the tank. The perforations are small and are all a few inches below the water level. Thus as the steam bubbles through these perforations a circulating current is produced which brings new water in contact with the steam as it enters. This absorbed steam is again given off when the pressure is reduced in the main leading to the turbine. As the regenerator is fitted with a dome, and also as its action is such as to drain all condensed water from the steam, the steam becomes dry and saturated and usually contains less than 1 per cent. of moisture. This feature is important as at the high velocities of turbine blading small quantities of water erode the blades.

We will now consider a regenerator for the hoist outlined above. The regenerator is to be used in connection with a twin 24 x 36-in. simple noncondensing engine (hoisting) discharging an average of 12,000 lb. of steam per hour. The engine averages three trips per minute and the steam inflow is for 6 sec. per trip. The exhaust of the engine reaches a maximum rate of 650 lb. of steam per minute for 6 sec., and no steam for 14 sec. The regenerator is then to receive steam at the average rate of 10.8 lb. per second for 6 sec.—that is, 64.8 lb. during the hoisting cycle. In 20 sec. approximately 65 lb. of steam enters the regenerator, or with three complete hoists per minute the regenerator will receive 195 lb. of steam.

Conditions Influencing Choice of Installation

A regenerator for this duty will be approximately 9 ft. in diameter and 25 ft. long. It will discharge in a steady flux the steam it receives under the foregoing conditions, providing that the pressure is permitted to drop from 4-lb. gage to 0-lb. gage. A relief valve, inlet and outlet connections, gage glass, water filling and overflow connections and water regulating floats and valves should be furnished complete with the regenerator.

Several conditions enter into the choice of types of condensers and auxiliaries. Of first importance is the cooling water, which should be plentiful, pure, and of normal temperature. Preferably the supply should be close to the plant. There should be no possibility of water famine. The feed-water for boilers is the next consideration. This, as is well known, should have no scale-forming impurities, for it means an increased cost for generating power, of 15 per cent. with $\frac{1}{16}$ in. of scale, and as much as 70 per cent. with $\frac{1}{2}$ in. of scale. This latter thickness is not at all unusual around plants using mine water. Of course, these percentages vary with the boiler area that is covered by scale and also the quality of scale. In any case the fuel costs are excessive.

If surface condensers are installed, for the purpose of returning the water to the boilers, provision must be made for extracting the oil from the exhaust steam before it reaches the condenser. This is best done with

exhaust steam oil separators, which are guaranteed to extract as much as 95 per cent. of the oil from the steam, and as much as 97 per cent. in other cases, particularly when the separators are properly cleaned. These separators should not be placed within 5 ft. of any elbow, valve or other arrangement that would prevent a straight, uniform flow to the separator, as the efficiency is much reduced when the steam contains too many eddy currents.

There are two general types of condensers—the jet and the surface condenser. The former intimately mixes the steam and water and the latter keeps separate the cooling element from the steam with a thin metal wall. The jet condenser, because of the mixing method of causing a vacuum, throws away the condensate; and the boiler feed in consequence must be taken from the main source of supply. Further, if precautions are not taken with the jet type of condenser, there is the possibility of flooding the condenser and turbine, should a stoppage occur at the pumps. There are, to be sure, the high-level and low-level jet condensers, but we consider that under the usual mine conditions in the low-level jet condenser is most suitable. There are several types of low-level jet condensers on the market. One of the simplest is the Rees roturbo jet condenser, which occupies a small space and may be direct-connected to an electric motor or driven by a small turbine through reduction gears.

Should the main source of water-supply be reasonably free from impurities, the jet condenser has several advantages over the surface condenser. Among these are lower first cost, lower maintenance, less space and the advantage of being able to use mine water and, under certain conditions, dependent upon the class of boiler fuel used and its cost, it is cheaper for 9-hour-per-day loads than is the surface condenser.

The disadvantages of jet condensers are that they require about 40 per cent. more power to operate than do the surface condenser auxiliaries; this is due to the jet condenser handling more air and also having to discharge against the atmosphere. The condensate is thrown away and its heat lost, the consequent use of only moderately pure feed-water causing boiler scale and consequent cleaning. There is also danger of flooding the condenser and turbine. The surface condenser is suitable where the cooling water is not adaptable for boiler feed, but contains no acid. If it is acidulous it would be cheaper to neutralize it and use a jet type of condenser than to replace surface condenser tubes continuously.

The amount of circulating water necessary is usually more than that required by a jet condenser, but as the head through the surface condenser is not usually more than 15 ft. (this presupposes tubes not corroded) the power required for circulating purposes is less.

Baffles in the surface condenser for the purpose of making the steam take a course close to the cooling tubes, should not be used unless the frictional resistance is less than $\frac{1}{10}$ in. of mercury. Besides the circulating pump an air pump and a condensate pump are necessary. The air pump is used to remove the air that is entrained in the steam or what enters the system through leaks. A small quantity of air in the condenser makes a decided difference in the vacuum. Thus 5 per cent. of the volume of feed water taken from the pond is air, and assuming that 5 per cent. more is added for leakage in the system, then if the leakage is doubled or made 10 per cent. the decrease in vacuum will roughly be $\frac{1}{2}$ in. of vacuum when the vacuum is between 27 and 29 in. referred to a 30-in. barometer. Thus it is important that the vacuum line be made as short as possible and that air leaks of all sorts are thoroughly stopped.

The condensate pump is necessary for the purpose of taking the water from the hotwell of the surface condenser and delivering it to the feed-water supply of the boilers. This unit must be set lower than the hotwell of the surface condenser.

The advantages of the surface condenser are that less power is necessary for driving the auxiliaries; the condensate may be used for feed water, consequently giving less boiler-cleaning troubles; no danger is present of flooding the turbine; and in case of a good quality of coal being used for firing the boilers the surface condenser is the cheapest, even for 9 hours daily running time, because as much heat as possible is retained in the condensate, and the condensate when fed back to the boilers keeps them free from scale.

The amount of vacuum to be carried by the condenser is important. The temperature of the circulating water, however, places a limit on the vacuum. This is shown in the following example: Assume that the ratio of cooling water to steam condensed is 60 to 1, and a permissible temperature rise of 15 deg. F. is the difference between the intake and discharge connections of the condenser, then with intake temperatures as follows:

At 50 deg. F., the highest theoretical vacuum obtainable is 28.9 in. vacuum
At 60 deg. F., the highest theoretical vacuum obtainable is 28.5 in. vacuum
At 70 deg. F., the highest theoretical vacuum obtainable is 28.0 in. vacuum
At 80 deg. F., the highest theoretical vacuum obtainable is 27.3 in. vacuum
At 90 deg. F., the highest theoretical vacuum obtainable is 26.4 in. vacuum

Suppose, however that we figured we could afford to pump 80 lb. of water for every pound of steam, the following would be the vacuum theoretically obtainable:

At 50 deg. F., we can obtain 29.1 in. vacuum referred to a 30-in. barometer
At 60 deg. F., we can obtain 28.7 in. vacuum referred to a 30-in. barometer
At 70 deg. F., we can obtain 28.4 in. vacuum referred to a 30-in. barometer
At 80 deg. F., we can obtain 27.7 in. vacuum referred to a 30-in. barometer
At 90 deg. F., we can obtain 26.8 in. vacuum referred to a 30-in. barometer

These vacua are never reached in practice since the cooling water never rises fully to the temperature of the vacuum. It is customary to specify the temperature of the water under average summer conditions, when the load around the mine is usually lower than the winter loads. By following this custom we have a much higher vacuum when the loads are heavy and thus utilize the steam to better advantage. This then brings us to the water supply and its cooling. If the plant is adjacent to a river and not too high above the water level to cause an excessive pumping charge, the circulating water may be drawn therefrom. Again, if considerable mine water is being pumped, this can be made to pass through the condenser, and in the event of a surface condenser being used, this may be done without the installation of a circulating pump.

The quantity of circulating water necessary depends on the vacuum carried and will vary from 50 to 100 lb. of water per pound of steam. In the case of the unit under consideration we will assume that the ratio is 60 to 1, which will mean that for 20,000 lb. of steam per hour we shall pump 2400 gal. per minute. Further, assuming an average summer temperature of 80 deg. F. for the water, we can obtain 27 in. vacuum, referred to a 30-in. barometer.

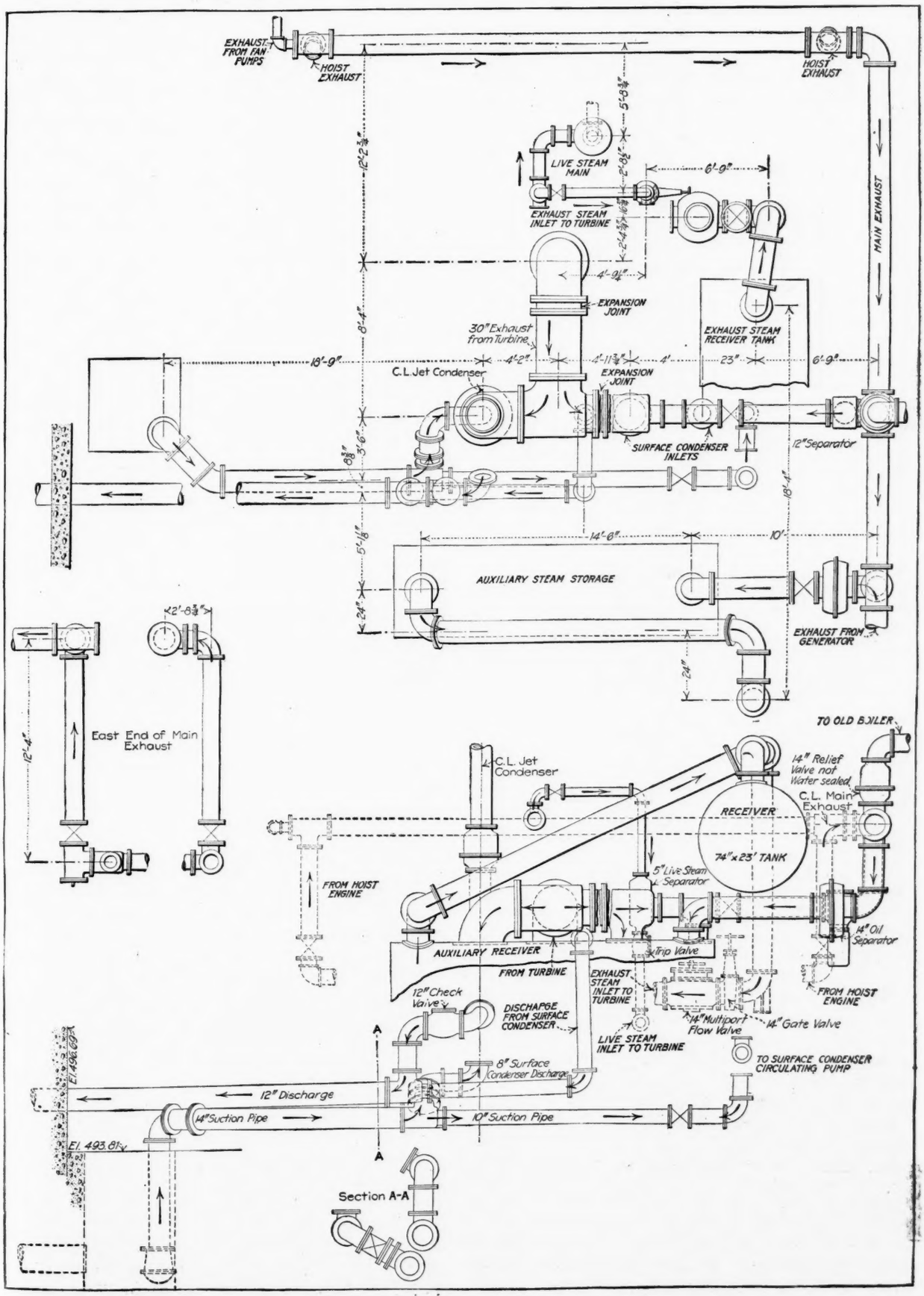


FIG. 3. LAYOUT FOR THE MAIN PIPING OF A 500-KW. EXHAUST STEAM UNIT

The following is a brief draft of specifications covering a surface condenser to comply with the assumed conditions:

1. The condenser is to furnish 27 in. of vacuum, referred to a 30-in. barometer, with 80 deg. F. intake water. The quantity of steam to be handled at full load of turbine is 20,000 lb. per hour.

2. The condenser is to be of the surface type and to work on the "wet system"—that is, to have one pump to handle the air and condensate and another to handle the circulating water.

3. According to the requirements of the coal company the exhaust inlet shall be at the top or at the side of the condenser; these shall be 30 in. in diameter, flanged and drilled with standard drilling.

4. The friction head of the condenser shall not be more than 15 ft. nor less than 5 ft. at the above-mentioned or other normal capacities.

5. Terminal difference is permitted of 15 deg. F. at the full load rating of the condenser.

6. Ample steam space shall be provided near the inlet for steam distribution.

7. Condenser shall be equipped with drain plates, to avoid flooding of tubes by condensation and to insure this reaching the hotwell with the least possible loss in temperature.

8. A heat transmission coëfficient of 300 to 400 B.t.u. per square foot of surface per hour for each degree Fahrenheit difference shall be used in the design of this surface condenser.

9. The design shall be such that the steam shall take the shortest path through the condenser possible; and the frictional resistance through the condenser shall be less than ½ in. mercury.

10. Auxiliaries shall consist of the following: One vacuum pump of rotary design for air and condensate; one centrifugal circulating pump, 30-ft. head; one steam-driven unit, turbine preferred, taking 100-lb. gage pressure, live saturated steam, noncondensing, all to be mounted on one base, direct-connected or through reduction gears; one 30-in. gate valve, for placing between turbine and condenser; one 30-in. corrugated expansion joint; one 14-in. atmospheric relief valve, multiport type preferred.

In the absence of a river or lake of water of sufficient capacity to supply the condenser and keep the water cool, or when little mine water is handled, cooling towers or sprays will have to be used for cooling purposes. Such devices permit the circulating water to be used over and over because the heat is extracted by either one of these methods.

With towers, the water is cooled chiefly by evaporation, which absorbs 75 to 85 per cent. of the heat, while convection and radiation absorbs the balance. This is accomplished by bringing a sufficient quantity of air in contact with the circulating water broken up into fine sprays. The quantity of water evaporated will equal about 75 to 85 per cent. of the weight of the steam passing through the turbine, and this loss must be replaced by a fresh supply.

Cooling towers are of two types—the natural draft and the forced draft.

The first method of cooling depends on air circulating naturally in and through an open tower. The latter method depends upon a fan forcing a certain quantity of air through a closed tower. The other method of cooling is by spraying. The spraying apparatus consists of several banks of nozzles, discharging the water into the air in fine, globular particles, and as these fine particles fall to the pond beneath an intimate contact is made with the air, which absorbs the heat taken up in passing through the condenser. The pressure necessary to make the spray varies according to the coolness of the weather. In summer it may be as high as 15 lb. per square inch and in winter as low as 3 lb. per square inch. Because of evaporation and drifting caused by breezes, etc., from 1 to 3 per cent. of make-up water will have to be added. Under general conditions with a well designed pond this is less than 1½ per cent.

Considering the 500-kw. plant which we are contemplating, the spray cooling system necessary will be as follows: Assuming 30 gal. of water per minute for every 2-in. nozzle, with an $\frac{11}{16}$ in. diameter opening, 80 nozzles should be sufficient. However, for the purpose of replacement and additional cooling, we will assume that eight more nozzles are installed, making a total of 88. The size of pond necessary for these nozzles will be approximately 1 sq.ft. for every 100 lb. of water cooled per hour, or in this case 12,000 sq.ft. This assumes that the nozzles are placed four in each group and the groups on 20-ft. centers. At least 20 ft. should be allowed, also, between the centers of the nozzles and the side of the pond. If the area available does not permit this, a fence will have to be constructed to prevent excessive water drift. The pond need not be deeper than 3 ft., but there should be a slight drainage toward the cold well. The power consumed by sprays varies from 0.75 per cent. of the turbine power at low heads to 2 per cent. of the turbine power at high heads. This power then has to be taken into consideration with the circulating pumps and their driving arrangements when the condensers are specified.

Power Consumed by Low-Level Jet Condenser

The amount of power consumed by a low-level jet condenser varies from 5 to 8 per cent. for units of from 200-kw. to 500-kw., and the power used by auxiliaries for surface condensers varies from 0.75 hp. to 1 hp. for every 1000 lb. of steam per hour passing through the main unit, for circulating pumps. The amount of this power is governed by the head. The figure given is for 20-ft. head and 70 per cent. efficiency. The air pump requires from 0.20 hp. to 0.5 hp. per 1000 lb. of steam, and the condensate pump, depending upon the head, from 0.07 hp. to 0.15 hp. per 1000 lb. of steam.

It is preferable that small turbines or other steam-driven units be used for the driving of auxiliaries, for although motors may be used to operate pumps, etc., and are connected up behind the circuit breakers, there is always a danger of something stopping the unit. Furthermore, if motors are used, they must be started by a separate generator, and it is preferable that they be driven by a separate generator entirely if the turbine is to carry the mine load. By studying the chart (Fig. 2, page 1050, *Coal Age*, June 8, 1918) it will be noticed that the vacuum varied as much as 1 in., partly because of the steam admission but chiefly arising from the variation in the speed of the motor, which was driven by the turbine. This unit was later connected up and driven by a separate generator, one not operating on a fluctuating load, and a much steadier vacuum resulted.

The space occupied by a unit of this size with condenser, auxiliaries, etc., with top exhaust from the turbine to the condenser, and the condenser set at the side of the turbine, will be approximately 24 ft. wide and 40 ft. long, including a passageway and room for a switchboard.

The steam connections for the usual unit will consist

of exhaust steam piping, vacuum piping, circulating water piping, drains and traps. Mixed pressure turbines will in addition require live-steam piping, and a surface condenser installation will require air and condensate piping.

For the exhaust-steam connection a pipe the same size as the turbine inlet should be used from the regenerator to the turbine, and an expansion joint of corrugated sheet copper, about one diameter in length between flanges, fastened to this inlet to take all pipe and expansion stresses off the turbine casing. Next to the expansion joint it is usually advisable to install a multiport flow valve, to prevent the vacuum backing up on the exhaust-steam main and drawing air through minute leaks. No. 10 or No. 12 gage spiral riveted pipe is possibly the cheapest to use for exhaust purposes, but the larger sized pipe—10 or 12 in. diameter—should not be allowed to carry more than 4 lb. per sq.in. pressure. A relief valve, preferably of the multiport type, should be installed either in the exhaust main or at the regenerator to prevent more than this pressure causing damage to the exhaust mains. The regenerator should be placed as near as possible to the turbine so that the driest steam available will be used in this machine. In the absence of a regenerator a large receiver should be used, so as to extract all water from the exhaust steam. A trap of ample capacity should take the water from this receiver, and if an oil separator has been installed to extract the cylinder oil from the steam before it reaches the receiver this condensed water may be returned to the heater or source of boiler feed.

The vacuum piping should be designed and installed with the greatest care. A loss of but ½ lb. through friction in the pipe line means a loss of 1 in. vacuum at the turbine, and as 120 to 130 cu. ft. of steam passes through the vacuum line for every cubic foot passing through the live-steam line, the reason for large vacuum lines is obvious.

It is also extremely important that these connections be short and have few bends and obstacles. For as explained previously the loss of 1 in. of vacuum, say from 28 to 27 in. of mercury at the turbine, will mean an increase of 7 per cent. in the steam consumption for the same power. This increase, although made on exhaust steam—that is, as it were, recovered for nothing—still means a definite loss per annum.

Construction Details of Vacuum Piping

The vacuum pipe may be made from riveted steel pipe, cast iron or regular welded steel pipe. The flanges, however, should be made of wrought iron or cast steel. The gaskets should be made from adhesive gum, as this softens with the heat and sticks to the flanges, thus preventing the gasket being drawn in by the vacuum. If valves are necessary, they should be of the gate type and of standard size, to prevent warping under continued vacuum. A water-sealed relief valve, preferably of the multiport type, should be installed at some point in the vacuum line between the turbine and condenser, but does not have to be larger in size than the exhaust steam inlet into the turbine.

It is preferable to so install the vacuum line that there shall be no low spots or pockets for the accumulation of condensed steam. Where this cannot be avoided vacuum traps will have to be used; as a general rule, however, vacuum traps are a decided nuisance and require constant attention. It is important that the expansion joint in the vacuum line be placed in such a manner that the vacuum does not tend to draw the condenser and turbine together. In one plant with which I am familiar, for several months a bad vibration was noticed in the turbine. It was ultimately found to be due to the vacuum tending to draw the turbine toward the condenser and thus throwing a decided stress on the turbine casing. Long bolts were inserted in this expansion joint to limit the travel of the piping on expanding, and no further vibration occurred. When connected up the vacuum line should be tested with the highest vacuum possible, and while the vacuum is still on the line, two applications of thick paint or hot pitch should be applied on all joints, and at least one coat of paint over the entire piping carrying vacuum, so that all minute air leaks may be properly stopped.

Intake Piping for Circulating Water

For the circulating water the intake piping will first be considered. As a general rule the pond is at some distance from the turbine site, and the intake piping has to be buried. It is not absolutely necessary that pipe be used for this waterway, for in the majority of cases the intake is of such size that it would ultimately be cheaper to use wooden casing, tile pipe or concrete, particularly if the entire conduit is below the usual water level of the pond. If this intake is longer than 200 ft., wells should be placed every 100 ft., and the height of the waterway should be such that a man can walk easily in it, even if there is a foot or two of sand at the bottom. Concrete is probably the best material to use for the intakes since the life of metal pipe when buried is short. Of all the cheaper metals cast iron has the longest life, and if this can be procured at a moderate figure it is wise to use it.

Whatever the construction of the intake may be, it is necessary to guard its mouth so that the entrance of leaves, sticks, fish, ice, logs, etc., is prevented. To do this screens of different mesh must be used, so arranged that they can easily be removed for cleaning. Provision must also be made for closing off the intake line from the pond, so that the cleaning of the intake may be properly done. The suction lines from the cold well must be installed with considerable care, fitted with foot valves and tested for leaks. These lines should also be provided with vacuum gages, so that trouble can be detected at once. The importance is readily seen for having the condenser set as near the water level as possible, so that the water is not elevated more than absolutely necessary.

For the discharge piping, it is important, in the case of a surface condenser, that the discharge connection be at the same elevation as the intake. The condenser should not be burdened with friction other than that caused by the water in the tubes, passageways, etc., which cannot be avoided. If the discharge piping is also placed under ground, the remarks that have been made concerning the intake will also apply here. In cases where oil separators are not installed to extract the grease from the steam, oil catchers should be placed at the mouth of the discharge to prevent the oil going into the pond, and afterward being drawn in with the feed water.

The air and condensate piping is subject to the same

provisions as the vacuum piping, and if leaks are present they may be located in the following manner: The line may be filled with water at a pressure of about 10 lb. per sq.in., and while the piping is full and under this pressure a thorough inspection should be made of the entire system. In cases where the vacuum piping is subject to this water pressure, extra supports should be placed under the piping to take care of the weight of water in the system, which in large piping, such as is usually used for turbines, would make an excessive weight on the permanent supports. If gas is available near the plant, the piping may be filled with it, testing for leaks with a candle. To fill the system with gas it is necessary to fill it first with steam, then close up the line, and as the steam condenses permit the piping to fill with the gas.

The condensate may be sent back to the open heater and then fed in the usual manner through the feed pumps to the boilers. In the case of a closed heater the condensate may be fed from the pump to the boilers.

All exhaust piping, live-steam lines and tanks should be covered with pipe covering. At 3 lb. back pressure per square inch, and 70 deg. F. room temperature, the steam condenses at the rate of 0.47 lb. per sq.ft. per hour. If 10-in. pipe is used and it is 100 ft. long, 135 lb. of steam will be condensed per hour if pipe is without covering. At 8000 ft. per minute velocity a 10-in. pipe will carry 9000 lbs. of steam per hour, and with the loss mentioned it means that 1½ per cent. of the steam is wasted in this length of piping alone.

In Fig. 3 is shown the main piping of a 500-kw. exhaust steam unit. Provision is made for the installation of both a surface and a jet condenser, each of sufficient size to carry the turbine itself. This arrangement was made so that at certain times in the year the mine water could be used, and at all other times the surface condenser would be operated. The surface condenser also is run at a reduced capacity at night, in order to save all of the exhaust steam, returning the condensed water to the heater. As deliveries would not be promised at an early date on regenerators, the tank, an old boiler, shown on the drawing, was used temporarily for storage purposes. The regenerator, when installed, was placed just outside of the building, and to avoid too much heat loss was covered with magnesia.

The costs for a 500-kw. unit will be approximately as follows:

	Per Kilowatt
Turbine and generator on its foundation	$25 to $30
Condenser and auxiliaries	10 to 12
Regenerator	6 to 7
Piping and fittings	6 to 7
Erection and installation of complete unit	5 to 7
Total cost of installation	$52 to $63
Operating Charges:	
Fixed charges—5 per cent. interest and 8 per cent. depreciation	$6.76 to $8.19
Oil, waste and other supplies	.60 to .90
Attendance, if necessary	2.00 to 3.00
Total annual cost	$9.36 to $12.09

As a general rule extra attendance is not necessary, as this unit is either placed in a building with other units or the old generators are dispensed with and their attendant takes care of the turbine. Assuming then that an attendant is an extra cost, and that the power factor is 80 per cent. of the full load, and that the turbine is operated for 9 hours for 250 days per annum, the cost per kilowatt-hour to the company will be from 0.52 cents to 0.672 cents per kilowatt-hour.

Disastrous Mine Fire at Villa

The mine of the Mill Creek Cannel Coal Co., at Villa, W. Va., took fire about 2 p.m. Monday, May 20, following what is believed to have been an explosion of the gasoline engine by which the mine fan was propelled. Thirteen men lost their lives, and much damage was done to the mine. Villa is a small town about 10 miles north of Charleston. Both the gasoline engine and the fan for which it generated power were located within the mine.

The chief inspector of mines at Charleston was promptly notified, but in the absence of a fan and other safety equipment for rescue work it was found impossible on the first night to make much progress in the exploration of the mine, as the cannel coal was burning fiercely. A fan from the mines of the Lebow Brothers, at Big Chimney, eight miles north of Villa, was brought to the burning mine. By Tuesday morning the fan had been placed in operation. Sometimes it was used to suck out the smoke and at other times to pump air into the mine. It was hoped that enough air might be supplied to save the 13 imprisoned miners. A line of hose was laid to the mines and a stream of water pumped into the drift in an effort to localize, as far as possible, the fire raging within.

In its efforts to extinguish the fire and to reach the men imprisoned, the State Mine Department was aided by the Federal rescue car, which reached Villa early Wednesday morning. Owing to the fire it was not till late that morning that the rescue party, headed by Chief Heatherman and State Inspectors Zach Evans, W. B. Riggleman, Eli Mason and B. S. Buckner, mine boss, and James Martin, superintendent for the Laing coal interests, were able to penetrate any distance into the mine. In a chamber about 400 ft. inside the mine they discovered the bodies of nine miners who, in an effort to brattice themselves in, had succeeded in building a wall of dirt and other material within a foot of the top of the tunnel. Conditions tended to indicate that all had died soon after the fire started.

The Mill Creek Cannel Coal Co., which operates the mine at Villa, is a Cleveland, Ohio, concern, J. L. Deegans being its president and general manager; F. M. Wattles is its vice president and B. R. Taylor its secretary and treasurer. The mines at Villa have been operating in a 3-ft. seam of cannel for 19 or 20 years, and they are among the oldest of the plants in the field in which they are located. The output of this particular operation is about 700 tons a month. Having had an opportunity to inspect the mine at first hand as the leader of the rescue party, Mine Chief Heatherman has been very severe in his criticism of the way in which the mine has been operated. He declares that it has been conducted in disregard of the fundamental principles of safety.

It seems that most mechanical stokers are smokeless not because they burn the smoke, but because they burn the coal in such a way that very little soot or smoke is produced. Hand-fired furnaces are smoky because soot is produced in or near the fuel bed, and can not be burned in the limited combustion space of the furnace.—*Bureau of Mines Bulletin No. 135.*

Coal Mine Photography—II

By H. A. WILLIAMSON
Fairmont, W. Va.

SYNOPSIS—*Various shades possess various actinic powers. By proper intensification shades actinically weak may be brought into prominence, or any color or combination of colors may be brought out while other tints may be rendered neutral. Thus by the aid of the camera and suitable screens one map may be made to serve several purposes.*

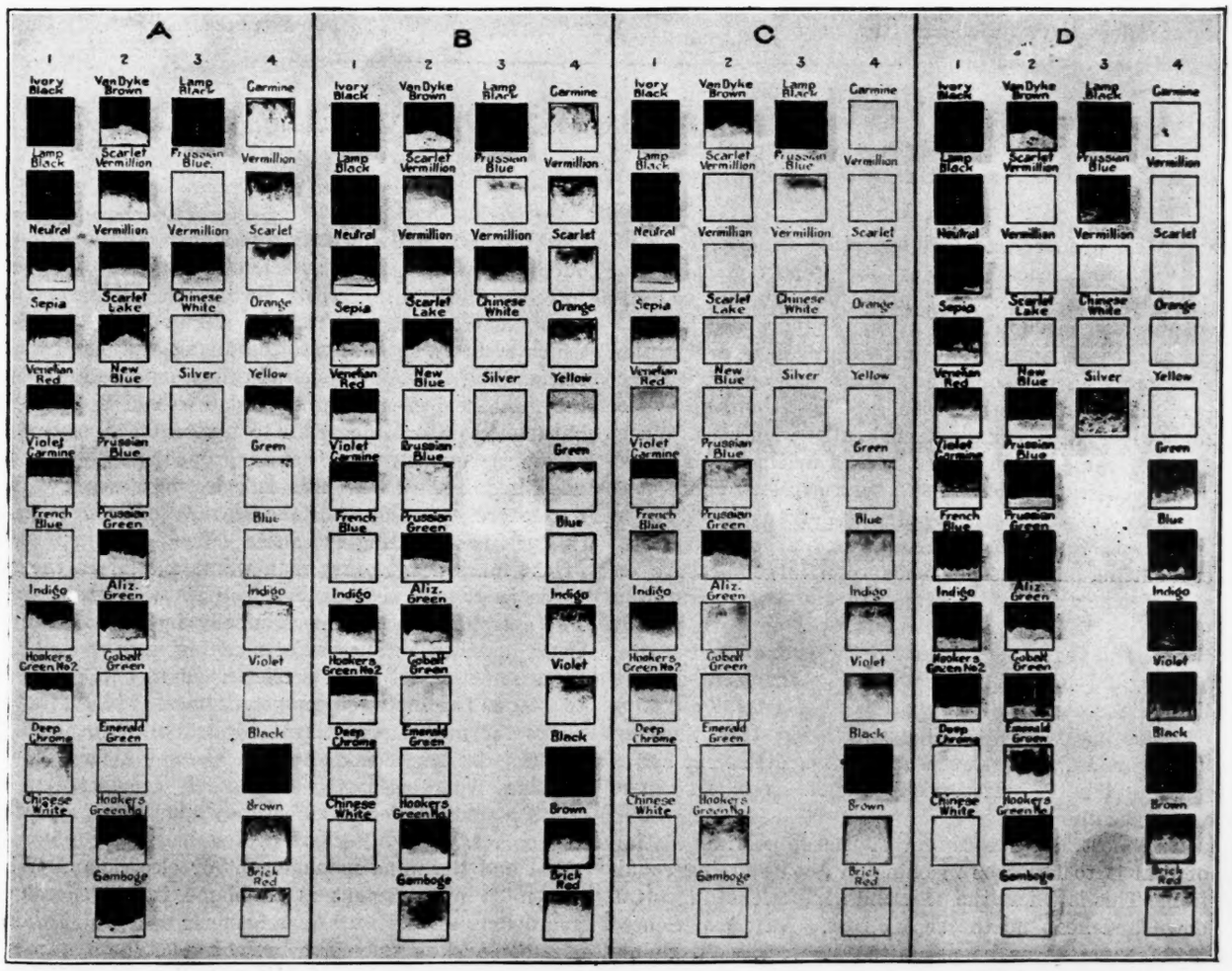
IN THE production of maps, particularly those made on tracing cloth or paper, little or nothing is to be gained, except in rare instances, by the use of other than black ink. It is not usually possible for more than a few people interested to see the original map, and blue or other prints made from the original do not show the colors. Errors are frequently made in using various colors, by getting a line in the wrong shade; and in many cases colors are more confusing to the eye than the simple black.

There are times, however, when it is essential to use various tints on a map, and it is necessary for the mapmaker to know the relative photographic value of colors if the maps are to be used in connection with photographic work.

The accompanying illustrations show the result of photographing various colors commonly in use in drafting rooms. With the exception of the blacks, which are laid on solid, these colors are made heavy at the top and shaded lighter toward the bottom in order to show the variation in value between a color heavily laid on and a thin wash.

Chart *A* represents the results of the use of an ordinary contrast, or commercial, plate. Chart *B* is from a panchromatic process plate. Chart *C* is from a panchromatic process plate and a light yellow screen, or ray filter. Chart *D* is from a panchromatic process plate with a bright red screen.

On each chart, column 1 consists of standard pan water colors, which are opaque in character; that is, they obliterate anything over which they are laid. Column 2 is shaded with standard pan water colors, translucent in character, or which do not entirely obliterate other



THE RESULT OF PHOTOGRAPHING VARIOUS COLORS WITH VARIOUS PLATES AND SCREENS

colors beneath them. Column 3 consists of special liquid water colors for drafting-room use. Column 4 is colored with standard "waterproof" inks for drafting-room use.

In general it may be said that blues and greens have the least effect on a photographic plate, while reds and oranges have the greatest. Thus a yellow or brown consisting largely of blue (a cold color) will have little effect on a plate, while a yellow or brown consisting largely of red (a warm color) will have great effect.

There are commonly in use seven screens—yellow, orange, orange-red, bright red, dark red, green and blue. The four charts, however, will serve to illustrate the purpose of these screens or filters. The orange and orange-red screens are intermediates between the yellow and bright red, and the dark red goes beyond the bright red. The blue and green screens perform exactly the opposite duties to the red screens; that is, where the red screen intensifies greens and blues, the green and blue screens intensify reds and yellows and cut out the greens and blues.

From these charts the draftsman can select the colors best suited for his maps. It is immediately noted that on all the plates the drawing inks do not have anything like the value of the water colors; yet, on the other hand, water colors are much more difficult of preparation in quantity, and it is therefore necessary to use the inks except in special cases. It is also true that no matter what plate or what screen is used, black ink and black water colors have practically the same effect.

The charts show, for instance, that it is possible to make a map lettered and showing political features in black ink, showing streams with indigo or violet ink, contours with brown and other features with scarlet, orange or yellow. From this map then, by the use of a proper plate and suitable screen, a reproduction may be obtained showing all the features, or those features in black, and any particular one of the others made prominent, with the balance eliminated. Thus from the same map we may have a plate showing political features and streams only; another showing political subdivisions and contours; one showing political features and triangulation, and so on in variety to meet the needs.

In order to successfully photograph a blueprint, one has only to use a panchromatic plate and red screen. Conversely, should you have a valuable map on which a bottle of red ink had been spilled, a plate which will show no indication of the blot may be obtained by using a proper plate and red screen.

It is not possible, in an article such as this, to more than point out a few of the possibilities along the lines indicated, but the interested draftsman can obtain extremely valuable detail literature from any of the large dry-plate manufacturers on the use of panchromatic and trichromatic plates and color screens (color screens are often called ray filters). The reader is also referred to the first installment of this article and to the article on the "Camera vs. the Pantograph," which appeared in the *Colliery Engineer*, January, 1915.

(To be continued)

Care and Management of Coal Cutters

BY "MACHINE MAN"
Sullivan, Ind.

THE proper care and operation of electric coal-cutting machines play an important part in deciding the cost of production at any colliery where these machines are used. Supplies are hard to get at present, and air-ship prices prevail in everything manufactured of iron, steel, brass or copper. These four materials, together with a little carbon, mica and rubber insulation, compose a coal-cutting machine. When properly cared for, however, such a machine is a great help to larger production, as a man can load about one-third to one-half more machine coal than pick coal.

It seems to me that a great deal of the efficiency of coal-cutting machines depends in a large measure on the efficiency of the machine men and electricians who look after them. I have been employed on machines for the past 10 years, both as helper and runner, and during that time I have seen men working on machines who had all the chance in the world to cut a large quantity of coal, but whose tonnage was low. If I were an employer, I would take two good machine men and a poor machine in preference to a good machine and two poor machine men.

The most important item in the economical cutting of coal is to keep the machine in good running condition. This is where the poor and inexperienced men fall down and heap up the repair cost. An inexperienced man should never be permitted to work as a runner on a machine. It is better to let the machine stand idle. Such a man will work a few days, and work hard, but he does not possess sufficient knowledge to successfully operate the machine. He becomes disgusted and quits, leaving the machine in a run-down condition, which will be a detriment to the hiring of a man capable of handling it. As a general rule a man wants to see the machine before he takes a job to run it, and it is hard to get a qualified man to take a machine that he knows is run down and not in proper shape to do the work required of it. This is even more so now than heretofore, on account of the scarcity of labor.

Much hard feeling is caused among miners because of the machines. Every man wants a trial on the machine as it pays a little better than other mine work. But every man is not mechanically inclined and many could never make successful machine men.

In some cases the electrician or machine boss is to blame for hiring incompetent men, while at other times the mine management is at fault. In some instances the machine man is to blame. I have known of cases where men who were fairly competent to operate machines would deliberately tear them up owing to some trifling difference which had arisen between them and the mine management or electrician. When the mine management is to blame it is generally a family or pet affair. As a general rule the foreman has some close friends or relatives. These naturally look to him to be favored with a good job, and in

nearly every instance influence him until they get it. If it is a machine they want, it is given them, and in a great majority of cases they fail on account of insufficient mechanical ability.

Where the electrician falls down is in hiring strangers. They come to him with a good recommendation, possibly given by some one who had never seen a machine. He hires them, as he is pressed for good machine men. In some cases they prove to be O.K., but a large percentage fail.

I believe a stranger should always be hired on condition—on probation, so to speak. Let the electrician go with him and watch him cut a few places. A poor man can be detected at once when at work. If he can't get around and keep things humming, he should be given a job at something else in the mine.

A mining machine is built to stand a great deal of abuse, but the less mistreatment you give it the better off you are both physically and financially. Before starting to work in the morning the runner should go over the machine and oil every bearing and examine all nuts, chains, etc., for loose or broken parts. If any are found, they should be repaired before starting. If only some small nut or rivet is loose, this can usually be remedied by the machine man quicker than he can get the electrician. But let me emphasize again that any difficulty of this kind should be rectified before starting the machine on an 8-hour grind.

Electrician Only Should Rectify Electrical Troubles

If some electrical part is not in working order, the electrician should be summoned in every instance, as this is the most delicate part of a coal-cutting machine. Here is where many men fail who otherwise would be good machine men. If a small nut or bolt breaks, one that is not sufficiently important to stop the operation of the machine entirely, they go ahead and run it, thinking perhaps they haven't time to make repairs just then, expecting to let the electrician know about it that night. Of course this is only a bolt, but it weakens the machine to that extent and perhaps throws double stress on another bolt, which in turn will affect the whole machine.

I have known instances where this very thing has happened—and before night the machine would be laid up for a week or two for repairs. The old saying that "a stitch in time saves nine" proves out in operating machines if in nothing else. Perhaps the fact that a little 5c. or 10c. bolt is gone will cause a piece to break that costs $100 or more and necessitate waiting until the manufacturer sends the piece.

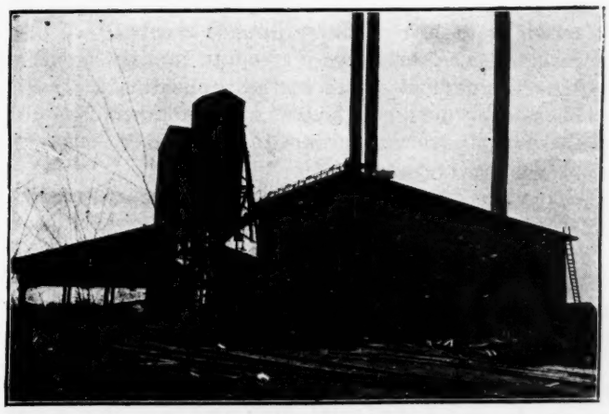
Just figure this out for yourself. Suppose an order will reach the manufacturers and be filled in four days, which is a shorter time than they generally take. Figure the machine at 150 tons per 8-hour shift, which is a low figure if shortwall machines are used. This would be 600 tons in four days lost to the operator and machine man. It means $33.69 in Indiana for each of the machine men and that much, if not more, for the operator. It also means just that much less coal for the support of the factory or railroad to which fuel is being sold. This loss will run into many hundreds of dollars in a year's time in three or four mines.

It seems to me it would be an economical investment for a company operating three or four mines to hire an expert machine man to make the rounds of the mines in turn, spending a day at each mine and doing absolutely nothing but watch the operation of machines and stopping them when he saw that it was necessary for the welfare of a machine. This stoppage would probably also be to the advantage of the machine men and company as well. A man who has successfully operated a coal-cutting machine for five or six years would use better judgment in this position than a shop man or electrician, for such a man knows the weak points of every machine after he sees it run a short time. He might not know the first principles of repairing the defect, but here is where the electrician or shop man should be called upon.

Good sharp bits are essential to the efficient cutting of coal. A machine should never be run after the bits become so dull and rounded on the point that they drag down the speed of the motor, as this only tends to heat the resistance and possibly burn it up. Pick-point bits are better for shortwall machines. If the coal is a little woody and tough, a half dozen chisel points interspersed along the chain are advantageous, as these will knock out the core left in tough coal when using all pick points. I do not think it advisable to use all chisel-point bits in shortwall machines, as they become blunt—or rather the edge becomes rounded—and drag down the speed until the machine men get behind with their cutting and possibly tear up something.

I once worked in a mine where the electrician got it into his "noodle" to use all chisel-point bits. In about three days the machines were so far behind with their cutting that the runners had to come back and cut at night. Furthermore, two bedplates were broken which cost over $100 apiece. Sullivan longwall machines were used in this case, and every drag chain became stretched to such an extent that it was almost impossible to load the machine after a room was cut.

I believe this strengthens my argument that a good machine man knows better what is needed to successfully cut coal than a shop man or electrician. I would like to see other articles in *Coal Age* regarding the care and management of coal-cutting machines, as we all will be helped by an interchange of ideas.



POWER PLANT, ENGINE HOUSE AND TIPPLE AT CHICAGO & CARTERVILLE COAL CO., MINE B, AT HERRIN, ILL.

National Coal Jobbers Hold Convention

SYNOPSIS—*Jobbers meet to discuss the coal situation and their relation to it. Speakers urge necessity for coöperation with Fuel Administration. Excellent addresses made at the banquet which followed first day's session. Wednesday's session witnessed an active discussion of the question of cost reports.*

THE second annual convention of the National Coal Jobbers' Association, which was held in Buffalo on June 4 and 5, was a notable affair. More than 200 members came from all parts of the country to participate in the proceedings, to discuss their status in the coal industry, and to affirm their readiness to coöperate with the Federal Fuel Administration in every way. President E. M. Platt conducted the proceedings with an even hand, and in his opening address recounted the energy with which the work of organization had been carried on.

Organization Making Rapid Strides

Less than nine months ago the association was originally projected at Washington, and since the formal organization at Chicago in October, 1917, the membership has grown to 600—a membership thoroughly representative of the jobbers of the entire country. President Platt pointed out that there is no longer any question raised by the Fuel Administration as to whether the jobber is essential, the association having obtained the complete recognition of the Fuel Administration and established itself firmly as a coördinate branch of the coal industry, with a representative on Dr. Garfield's staff.

The first day's session was made especially valuable and interesting by Noah H. Swayne, 2d, who acted as the Commissioner of the association in Washington and did yeoman's work for it, to the sacrifice of his jobbing business in Philadelphia. Mr. Swayne appeared on the platform several times, first giving a chronology of the proceedings in the coal trade since the Fuel Administration was appointed, then returning to urge the jobbers to furnish reports to the authorities when asked, as these reports were made the basis of intelligent action. Abuses were creeping into the trade, said Mr. Swayne, and instanced the application for jobbers' licenses by men who had no right to them. Many of these applications, continued the speaker, came from producing interests.

In the afternoon Mr. Swayne answered questions from the floor regarding trade regulations, but usually convicted the questioner of not having read the Fuel Administration's bulletins. (At the banquet a speaker made some humorous remarks about Mr. Swayne's ability to quote from these bulletins, now about 40 in number, by page and line.)

Secretary Leo Romanski reported that the association was in good financial standing, and in a later report on the jobbing situation in Chicago asserted that the local fuel administrators in the west were usurping the place of the jobber, who is not being treated fairly. The banquet given Tuesday evening was largely attended. The toastmaster, Harry D. Williams, took a notable part in the speaking, and the addresses made were eminently fitting for the occasion. Vice president William R. Coyle, who is about to return to the marine service, uttered words of counsel and inspiration. He spoke of the interests of producer, distributor and consumer being equal, and urged that all should do their utmost to pull together.

Alfred W. Calloway had come up from Washington to reason with the jobbers, and he told them they ought to coöperate in every possible way with the Fuel Administration, to the end that the most be made of what promises to be an inadequate coal output. He condemned the dirty coal that many operators and jobbers were offering. To mine and distribute this coal was a great waste of time and resources, and it actually curtailed production. The utmost effort must be made to keep production from falling off. Another draft was near, and it would carry off many men. He believed that working hours must soon be regulated by authority. Mr. Calloway does not like the word "jobber," and suggested that the name of the body be changed to National Association of Coal Distributors. (The association next day left the decision to the executive committee.)

Francis S. Peabody in an address took up the question of compensation and illustrated his idea by quoting Ralph Waldo Emerson. Mr. Peabody believed that cooperation and loyalty were synonymous. With the other speakers he eulogized Dr. Garfield and said that the latter was loyal to the jobbers. Let us help Dr. Garfield, said Mr. Peabody, and the jobber will receive a just compensation.

Valuable information as to cost reports was imparted at Wednesday's meeting by Jean Paul Muller, of Washington, an expert accountant. He urged the freest and fullest reports. The difficulty so far was that the reports made were not on a uniform basis. The speaker promised that nothing would be made public by the Fuel Administration.

Cost Reports Came in for Much Discussion

There was much discussion of the question of cost reports. It was insisted that the association, as well as the Fuel Administration, ought to know what it cost the jobbers to do business. Mr. Platt stated that the anthracite trade knows to the fraction of a cent what its costs are, while the bituminous jobber knows nothing. Mr. Swayne said that if the bituminous jobber did not function 100 per cent. there would be disaster. The costs should be based on zones. An entering wedge had been obtained in adequate reports from the smithing trade, and the bituminous trade must drive it further. Also, concluded Mr. Swayne, the jobbers need this information for their own self-education.

Officers for the ensuing year were elected as follows: President, George M. Dexter, of New York; vice president, Charles E. Cartwright, of Toledo; secretary and treasurer, Leo Romanski, of Chicago.

A Great Disaster

By Edward Mott Woolley

A great disaster threatens the readers of trade papers. When the new zone system of postal rates goes into effect next July these papers will be affected more than some other kinds of publications, and this means that their readers will suffer heavily by being shut off more or less from this wonderful fund of information.

Trade papers carry a large proportion of advertising and therefore the burden of the postal increase, ranging from 50 to 900 per cent., will fall very heavily on them. Now anyone who uses the trade papers knows that the advertising pages, while published for profit, are read for information just as much as the editorial pages. If the publishers were to eliminate the advertising and print simply articles, what a vacuous magazine we would have! The advertisements reflect the whole industry represented by any given trade publication. In the aggregate the advertisements of all the trade papers stand as the index of American industry. Indeed, the status of each industry is presented in undeniable truthfulness every week or month. Shopkeepers, mechanics and students depend upon these journals for their broader knowledge of the particular industry in which they are engaged.

The ill-advised postal zone law will make it impossible for these trade papers to exist in any such form as they do now. Inevitably they must be curtailed so radically that the benefits we now get from them will be largely wiped out. If you don't want this disaster to fall on you, make the fact so plain to your senators and congressmen that they will repeal this destructive zone law. Write to your Congressman to repeal this destructive and disastrous postal "zone" law. And do it right away.

Illinois Mining Men Visit Pittsburgh

During the week beginning May 6, a party of about 20 mining men from Franklin County, Illinois, visited the Pittsburgh district at the invitation of the United States Bureau of Mines, observing explosion tests in the Experimental Mine of the Bureau, and also studying the mining methods of the district. The party was under the leadership of Evan D. John, Director of the Department of Mines and Minerals of the State of Illinois, and consisted of a commission appointed by the Governor of Illinois to study Franklin County conditions, and of superintendents and foremen representing a number of coal companies, and of official representatives of the miners. This trip was made possible by the enthusiastic efforts of D. W. Buchanan, president of the Old Ben Coal Corporation. The program for the week was arranged by J. W. Paul, of the Bureau of Mines.

On Monday and Tuesday, May 6 and 7, demonstration explosion tests were held at the Experimental Mine, which is located near Bruceton, about 15 miles south of Pittsburgh. For these tests coal dust was prepared from a sample of coal from Franklin County, Illinois, which was furnished by the Old Ben Coal Corporation. The coal was crushed to the same size as the road dust samples which had previously been taken in the same mine from which the coal sample was obtained. Care was taken in the handling and preparation of this dust so that the natural moisture of the coal was practically all retained. On Monday, the coal dust was mixed with enough incombustible rock dust so that the explosion died out within the test zone. On Tuesday, the conditions of the test were changed so that a strong explosion was obtained. The explosion was stopped, however, by a special form of rock dust barrier (the Rice concentrated rock dust barrier, described in Technical Paper 84) developed under the bureau's auspices. Although pure pulverized Pittsburgh coal dust was loaded on the outby side of this barrier, a guncotton tuft nearly 6 ft. away remained unburned after the test, showing that the flame of the explosion was effectually stopped by the rock dust. On Wednesday, the party visited the Filbert mine of the H. C. Frick Coke Co., which is near Brownsville, Penn., and also the Continental No. 1 mine of the same company, near Uniontown. On Thursday, they went to the Keystone shaft mine of the Keystone Coal and Coke Co. On Friday, some of the men returned to the Experimental Mine to see a third explosion test, in which a small percentage of gas was used, while others visited the Montour No. 4 mine of the Pittsburgh Coal Company.

Most of the men returned to Illinois Friday night, feeling very well repaid for the trip. It is hoped that mining men from other districts will follow the example of these progressive Illinois men and make trips into fields other than their own in order to study modern methods which may have been developed in such other fields.

Conservation of Technical Engineers

Technical engineers of every branch of the profession who are taking part in the war activities of the Army and Navy are alarmed at the unfortunate waste of technical training caused by the drafting and enlisting of engineers for regular service with little or no regard for their technical attainments. These technically educated and experienced men are essential to the successful conduct of the war and cannot be replaced. There is continuing evidence that America is repeating in some measure England's mistake of sending technical men into the ranks when they should be carefully conserved for special duties in the fighting forces or on the technical staffs of the Army, the Navy and the essential war industries.

The Engineering Council, founded by the American Society of Civil Engineers, the American Institute of Mining Engineers and the American Institute of Electrical Engineers and other engineering societies, and representing some 50,000 engineers has addressed an appeal to the Secretaries of the Army and Navy that these men be placed in such places as will enable them to do work for which they are best fitted.

For this purpose it recommends that all engineers suited for technical service be enrolled and conserved for technical duties. Already from 10 to 15 per cent. of the members of the societies mentioned are in the uniformed service of the country, and it is safe to say that the majority of their remaining members are in the Government civilian service or are otherwise directly or indirectly engaged in the war.

Lubrication as an Aid in Stimulating Coal Production

BY REGINALD TRAUTSCHOLD
New York City

SYNOPSIS—*The labor supply at coal mines is diminishing, and the car supply shows no signs of continuous adequacy. All possible mechanical aids to mining should be adopted, but first present equipment should be brought to capacity. In transportation equipment poor or inadequate lubrication means unnecessary and expensive frictional losses as well as an output not at a maximum. Oil as a pitcar lubricant has many shortcomings, most of which a semi-grease obviates.*

THE war, the weather, labor scarcity and curtailed transportation facilities all combined last winter in a drive upon the industrial activity of the country, a drive which failed in its objective only through the moderation in effectiveness of some of the forces mobilized. The cost of averting a serious coal famine was colossal. The most stringent measures had to be resorted to, much privation and no little suffering had to be endured. Yet in spite of the price paid, the drive was not entirely arrested, but simply retarded, with the prospect of a resumption next winter with added force, for the labor situation then will probably be even more acute than during the past cold season.

The war, the direct cause of the unprecedented demand for fuel, will tax our coal resources to the utmost. The weather may not be as severe as last year, it is true, but the car shortage cannot show any substantial improvement in view of the fact that no reserve car capacity can be built up while there is such a crying demand for every foot of carrier space that can be constructed, in spite of any degree of efficiency which may be realized by the Government in handling the available number of freight cars.

MINING METHODS MUST BE BETTERED

The claim has been made by certain coal-mine interests that more coal could have been mined last winter with the labor then available had the railroads been able to transport it. Even if this be true, conditions will doubtless be much more critical next winter, for men and mules will then be much more scarce. It may be almost impossible to maintain even the coal output of last December and January with the present-day average efficiency in coal mining. Coal-mining efficiencies and methods must be bettered, if a catastrophe is to be averted.

Every mechanical aid for the miner must be adopted. Mining machines must be more extensively used to cut the coal, greater care must be taken in laying out trackage and proper attention to rolling stock will be mandatory. All this, and more, must be done with the least possible interference with the present rate of coal production. No curtailment of output can be tolerated, nothing but increased production countenanced.

The very first requirement, then, is to bring present equipment up to the highest possible standard of efficiency and maintain such improvement. This will materially lighten the labor of the underground workers, facilitate the handling of the coal on the tipple, etc. It is a necessity, if output is to be stimulated with a decreased number of men. With a limited working force, fatigue will be an unusually vital factor in the efficiency with which the underground workers and the mine mule can labor.

The work of the miner can be lightened and output maintained (in spite of fewer available skilled workers) by supplying him with every mechanical aid, by the more general use of mining machines, and the loading of mine cars with mechanical loaders; simultaneously the transportation of the mined material, between the face and the tipple or shaft bottom, can be made much easier, if the mine-car journals are kept properly lubricated.

EFFICIENT LUBRICATION MEANS ECONOMY

The lubrication of mine cars offers one of the most profitable of fields for betterment in mine operation. Any improvement attained therein represents a net monetary saving without a cent of initial investment. At any time, proper lubrication of mine cars pays a handsome profit, but in periods of stress the gain is increased several fold. Thousands of mine-car journals are not properly lubricated today, and, compared with those which are, they entail not only a serious waste in power, whether this be man, mule or mechanical, but a lubrication cost of from 10 to 20 per cent. more than in the case of properly lubricated cars—frequently, even a larger percentage. In this waste, for it is nothing else, no account is taken of increased deterioration, breakage and replacement charges for poorly lubricated mine cars. The figures given cover only the waste resulting from decreased lubrication efficiency.

The variety of running gear on mine cars naturally has a decided effect upon the ease with which the cars can be handled, and consideration should be given the question of substituting improved bearings for those of less efficient type. But the first step taken should be to secure the most efficient lubricant for the existing journals and see that such lubricant is properly employed.

The lubrication problem in a coal mine is a serious one, for the service to which the mine cars are put is severe. More or less dust and dirt is present in the air; the bearings are subjected to marked variations in load, on account of the unavoidable heaving of the cars as they pass over inequalities in the roadbed; the tracks are apt to become slippery through dripping lubricant, thus reducing the effective tractive power of

the haulage motor. Also, in certain sections of the mine, at least, illumination is insufficient to permit satisfactory inspection of bearings.

The requirements for an efficient car lubricant are: "Body," or viscosity, sufficient to prevent contact of surfaces; freedom from corrosive acids; as much fluidity as is consistent with body; effectiveness in reducing friction; high flash and burning points; freedom from substances likely to cause gumming or oxidation.

A lubricant to possess these six essential properties can only be produced from non-gumming, paraffin base, petroleum oils. It should have the "tenacity" of grease and reasonable durability if it is also to possess the necessary quality of being economical in use. In addition, it should be nonvolatile and not liable to change under the variations in temperatures encountered in mine service. Such temperatures are fairly constant throughout the year within the mines, but out in the open are subject to variations from zero in winter to around the hundred mark in summer.

The requirements of an efficient mine-car lubricant have thus been emphasized before considering the shortcomings of "black strap," or "black oil," the usual lubricant for mine-car journals since almost the days of the first coal mine, in order to show the lubrication problem confronting every coal-mine operator.

Without going into a scientific analysis of black oil, the composition of which is found to vary considerably in different localities, some of its admittedly common failings will clearly demonstrate that it cannot successfully discharge the functions of an efficient mine-car lubricant. In the first place, its body is readily affected by heat, as are also its lubricating qualities. At some definite temperature it is doubtless of the desirable density, but when subjected to heat, frictional or otherwise, it becomes so fluid that from 50 to 90 per cent. escapes from the bearings. These leakage figures have been repeatedly confirmed by carefully conducted tests under actual working conditions. Consequently, from two to ten times as much black strap has to be employed as is effective in reducing journal friction.

Serious as is the monetary loss from this direct waste of lubricant—cheap, though the oil may be—the after results are nearly sure to be even more expensive. The dripping oil is liable to fall on the track, resulting in a decreased grip of driving wheels on the greased rails and unprofitably taxing the haulage locomotive. The footing for haulage animals is in some cases made insecure and the galleries and passages become more or less saturated with an inflammable oil. The flash and fire points of black strap are relatively low, so that the already high fire risk of a coal mine is increased—particularly should there be any wooden trestles for the cars to pass over such as overcasts, and the like. Furthermore, an oil that so readily increases its fluidity in ordinary service as black oil, will as readily gum.

A lubricant of insufficient body—whether its excessive fluidity is characteristic at ordinary temperatures or developed under slight heat—cannot prevent contact of bearing surfaces under load, so that the coefficient of journal friction remains high. In mine-car service this is particularly disastrous, for the heaving of the car as it travels over any inequality on the track first squeezes the thin lubricant from the bearings and then sucks it back again charged with whatever dust and grit has been gathered from the air. The abrasive material thus carried into the bearings proceeds to "gouge" the wheel bores and axles.

A summation of even the few disadvantages attendant upon the use of black strap as a mine-car lubricant here enumerated would total to a considerable amount if valued in dollars and cents.

The essential properties of an efficient mine-car lubricant—requirements which will not only stimulate production but are demanded by economic considerations for minimizing coal-mine risks—are not all to be found in any one natural oil or grease. For a lubricant to possess the six functional properties combined so as to discharge effectively the exacting duties demanded in mine-car operation, it must be a blend of mineral oils scientifically, accurately and intimately compounded.

No coal mine has the facilities or the experts with the necessary experience to produce such a lubricant, even if the various ingredients were available. This is a task for the highest skilled specialist, with the facilities afforded only at the works of an oil refiner actively engaged in the production of lubricants.

The Swan & Finch Co., of New York, produces the mine-car lubricants marketed under the trade name Slo-Flo. These lubricants are the result of much experience and testing in the light of an intimate knowledge of the requirements to be met. The use of these semi-greases has been so satisfactory that a number of mine-car manufacturers now recommend the particular grade of this lubricant best suited to their particular running-gear construction.

Successful Mine-Car Lubrication

Such lubricants must obviously be procurable in more than one grade, for the lubricant best suited for one type of bearing is not necessarily the most desirable for one of a different class of construction, even though the service for the coal cars which the bearings are to serve may be identical. For instance, the lubrication of a plain cast-iron bearing does not present the same problem as does that of one of hollow flexible roller construction, such as the Hyatt. A comprehensive study has been made of mine car lubrication and lubricant suitable for each specific construction developed. Though this may multiply the number of lubricants for the coal mine to stock, it has the decided advantage of furnishing the mine owner with the concrete results of years of experimenting and testing on the part of lubrication experts.

Furthermore, the quality of these lubricants is invariably backed by comprehensive guarantees for satisfactory results, so that the mine owner who will use the product of a lubricant producer of standing, assumes no risk. No reputable oil refiner dares to make claims for his products, today, which cannot be substantiated in competitive tests. The efficient compounding of lubricants has become a science, the importance of which is daily becoming more generally recognized, and sales are now more often closed on the strength of economic and efficient results than, as frequently in the past, on the basis of initial cost.

Proper lubrication of mine-car journals lessens the arduous task of handling the cars and permits the transportation of maximum loads. It is an invaluable aid in stimulating coal production.

BOOK REVIEWS

Shows Where Coal of Given Quality Is Obtainable

THE COAL CATALOG COMBINED WITH THE COAL FIELD DIRECTORY. Pp. 671; 9 x 12¼ in.; 96 ill. Keystone Consolidated Publishing Co., Inc., 302 Penn Ave., Pittsburgh, Penn.; price $25, Cloth boards.

The "Coal Catalog" is the first attempt we have seen to supply the coal purchaser with such facts regarding the coal industry as he has long needed. Judging by the many letters which come to *Coal Age* regarding the places where coal can be purchased of a certain specific kind, it is evident that a book of the nature of the "Coal Catalog" is in great demand, and it is therefore not at all surprising that the number of copies disposed of is already large, especially in view of the disorganization in distribution resulting from the coal shortage and the zoning regulations. The reader of this notice will probably judge from the title that the book is a catalog of mining machinery with a minimum of directory. He will be surprised, therefore, to learn that the book has no advertisements whatever and makes no mention of mining equipment except in listing the outfits owned by the various mines. Even in this case the names of the concerns by which the equipment was manufactured are not given.

The volume opens with twenty pages on the geology of coal, followed by four pages on geological and mining terms. These are doubtless included as a concession to completeness. The real interest to the coal buyer starts with page 33, where a description of the coal areas of the United States is given followed by a map of the United States with all the fields plainly delineated.

Listed by Mineralization, Use and Structure

Then follows a classification of coal, and this the coal purchaser will find most interesting. The matter is generally none too well understood, and Mr. Zern has done well to quote from Marius R. Campbell's "The Coal Fields of the United States" for the first classification, which is "according to rank," that is, "according to the degree of mineralization," which, by the way, would probably be a better way to describe the method of division. The second classification, "according to use," is probably the most interesting of all classifications. The purchaser is apprised in this section regarding the type of coal that will suit his particular purpose whether he needs it for beehive coking, bunkering, byproduct coking, cement burning, domestic use, export, the manufacture of illuminating gas, use on locomotives, metallurgical use, use as powdered fuel, the manufacture of producer gas, the raising of steam, smithing, tile and pottery burning, or the making of water gas.

The third division is according to physical structure. In this division block coals, splint coals and smokeless coals are described. It may be noted that the author does not say what the structure of smokeless coals is, and it may be doubted whether a smokeless coal must necessarily have any given structure. The smokeless coals of Pennsylvania are different from those of Maryland.

Three pages on preparation of coal and seven on coal storage follow those on classification, and three pages are given to coal analysis, in which the bearing of the presence of moisture, volatile matter, fixed carbon, ash, sulphur and phosphorus in coal are discussed.

A tabulation is made in Part II of all the types of coal and the fields and seams of their occurrence, and in these tables the places in the book in which such types are described are correlated. Thus the reader can readily find where the coal in which he is interested is described, where its analyses are given, where the operators of the seam or field are listed and where the directory of the mines operating in the seam or in the field is to be found, and this for the whole United States.

The coals are divided up not only according to mineralogical rank but also according to their use. Thus if you desire anthracite coal you will find it is produced in the Gunnison County field of Colorado, and the details just noted can be found on certain specified pages. If a search is being made for a coal suited to brick and tile burning, the reader will find that the Hartshorne lower seam in Oklahoma is adapted to that purpose, and that references to the seam and its characteristics can be found in four pages specified.

Pennsylvania Has 57 Per Cent. of All Wasteful Ovens

A long list of coke ovens follows. Pennsylvania is credited with 48,708 beehive and rectangular ovens, West Virginia is said to have 16,511 such ovens and Alabama has 6111. It is interesting to note that Illinois has only 104 such ovens, Ohio 178 and Oklahoma 200. A list of byproduct ovens is given with the consuming capacity of the ovens, and the estimated coke production.

In Part III we come to the separate states, Alabama leading. It is fair to take it as a sample, seeing that it is a state where the editor of the "Coal Catalog" has, if we mistake not, never been domiciled. Columnar sections of the coal measures are followed by a map of the state with the basins clearly outlined. Each basin is described at length in the sections that follow. Almost a page of typical analyses are also given. The mines are then listed by basins and seams, and some account of the customary modes of preparation are given. Then follows the regular directory material with which our readers are already familiar.

About each mine new information has been added regarding the character of the product—whether it be steam, coking or smithing coal, for instance; the trade name—Blue Creek, for example; the mining district—Warrior, let us say; the size shipped—run of mine, slack, pea, nut, egg and what not; the preparation equipment—shaking and revolving screens, washery or some like description. Thus the reader knows that the particular type of coal for which he is looking can or cannot be provided for by the firm listed.

How the Coal Fields Are Delimited

In some states the fields are so naturally distinct that it has been possible to map them. In others the device is to use a circle round the natural center of the field described. Thus in Arkansas circles mark out the Bates-Coaldale, the Greenwood-Huntington, the Bonanza-Jenny Lind, the Denning-Coal Hill, the Spadra and the Paris fields. But in Colorado there is a different plan, the fields being clearly separated, though here the coals of any one field are not of uniform character. In Maryland, of course, it is quite easy to name and chart the fields and consequently it has been done.

The anthracite region of Pennsylvania is admirably treated in this volume. A number of cross-sections are given, the character of the coal in each region is noted and a valuable map of the different districts has been added. No attention is paid to the seams mined. Most concerns mine and mix the coals from many seams, and the many different names used to designate a single seam and the many splits of the same seam make identification almost impossible.

The editor, E. N. Zern, has done the best he could with the Pennsylvania bituminous region. Some day something better will be done, but at present the trade names being used are quite vague and misleading. Owing to the

difficulty of securing a more perfect nomenclature these trade names have been used by the author and no definite limits to the areas designated have been drawn.

For instance, DuBois is allowed by the editor to choose its own district. It can make its selection between the Reynoldsville, the Shawmut and the Clearfield districts. Though DuBois is in Clearfield County, the coal more closely resembles that from the Reynoldsville field adjacent. Probably it will ultimately be classified in that field. The Clearfield coal might be better called Moshannon or First Basin coal. But in that event something will have to be done for the naming of the two intermediate basins.

Mr. Zern has merely attempted the possible. Had he boldly broken with trade names, the trade would doubtless have only been confused and he would have involved himself in endless discussion. Still, some day the work must be done, and surely the tidewater pooling arrangements might be held to serve as a guide wherever they are in effect. It would do no harm in future editions to give the groupings in which these pools are divided.

There is in this book much of great value to every one who produces, trades in or uses coal. It is a wonderful compilation, made by one who is probably more capable of performing the work than any other man except some of the officials of the United States Geological Survey. The work has been done conscientiously. It is a model production in every way and one the industry may be proud of. The 671 pages are full of material that it took much labor to assemble and much scholarship to compile. We have no hesitation in giving it unqualified approval.

Must Make Drastic Coal Saving

After a detailed survey of the fuel situation, Dr. Garfield, on Monday, June 10, called the newspaper men into his office and told them that the matter of fuel supply for the coming year "is one of the most difficult and threatening problems the war has presented." Requirements aggregate 80,000,000 tons more than was produced last year. It was pointed out, however, that unexpected additions to estimated fuel requirements are taking place all the time, and it was admitted that 100,000,000 tons is an estimate which provides only a nominal margin of safety.

It is estimated that the 360 non-war industries will require about 100,000,000 tons of coal. It is believed that production of coal this year will exceed by 50,000,000 tons that of last year. To prevent serious curtailment of industry, fully 60,000,000 tons of coal must be saved by various means of conservation. At the conference, the correspondents were furnished with a written statement of the situation. This extract from that statement shows the seriousness with which Fuel Administration officials regard the outlook:

A saving of sixty million tons of coal is the one possible avenue of escape from national disaster. Necessities of war must be supplied. The coal deficit must inevitably come out of the necessary fuel for non-war industries. These industries employ millions of our population and furnish the backbone of our national wealth. Factories will shut down and men be out of work in proportion to the coal deficit. Every ton of coal saved will keep fifty workmen from idleness and permit an additional creation of several hundred dollars worth of national wealth. The Fuel Administration has frankly given to the public statistics of an alarming fuel situation. It desires to state just as frankly and with all the emphasis possible that it is in the power of the American people through fuel economy to save the country from the effects of the fuel famine.

Since fuel and steel are the two factors which are limiting the non-war industries, Dr. Garfield explained that the reduction of supplies in these two commodities will be equal. Steel plants might find it possible, for instance, to furnish 50 per cent. of a plant's requirement of some specific kind of steel, but the Fuel Administration, in its allotment, might find that that plant is entitled to only 25 per cent. of its normal fuel supply. In such a case, only 25 per cent. of steel would be allotted. Arrangements have been made whereby the maximum reduction is to apply both to coal and steel.

Dr. Garfield told of his efforts to find the country's non-essential industries. He admitted that he has been unable to find any such industry. The Fuel Administration, however, has compiled a list of the non-war industries from which it will be necessary to take such fuel as may be required to meet the demands of the war industries. P. B. Noyes, the head of the conservation division of the Fuel Administration, told of efforts being made to build up war industries in communities supported largely by non-war industries, so that there would be no unemployment or disruption of established conditions of the community.

The velocity of combustion of hydrocarbons is faster than velocity of decomposition; therefore, combustion will take precedence over decomposition. For this reason air supplied over the fuel bed should be admitted as near to the surface of the bed as possible and mixed with the hydrocarbons, so that they will be burned before they are decomposed by heat and form smoke, which is difficult to burn in the rarefied oxygen of the furnace.—*Bureau of Mines Bulletin No. 135.*

Ideas and Suggestions

LARGE numbers of men have left the mines for employment in more lucrative industries. Thousands have been called to the colors, thousands more will be called in the future. Meanwhile the country is confronted with the likelihood of a fuel shortage that promises to curtail seriously the output of supplies essential to the welfare of our army in France and to interfere grievously with our war plans. In bituminous coal alone the mines of the United States must furnish over 630,000,000 net tons to satisfy the voracious appetite of our war machine and to keep the country warm the coming winter. It readily can be appreciated, therefore, that all ideas or plans which enable a mine to function to maximum capacity should be the common property of the entire coal-mining industry. If you know of a device that saves in time, labor or money; of a makeshift that was employed to prevent a shutdown while waiting for parts from the factory; of a system of mining that resulted in greater coal production; of a plan that filled the men with patriotic enthusiasm so that they labored more steadily and more efficiently—in short, if you have a suggestion that will help to win the war by the mining of more coal, it is your duty to write it up for publication in *Coal Age* for the benefit of its many readers. Sketches, diagrams or photographs should accompany the text in all instances where these are necessary to convey the message clearly. Aside from enabling you to do your part is the fact that if your contribution is accepted it will be paid for liberally.

To Increase Coal Production

It is necessary to add 1,000,000 tons to the weekly coal production if a serious shortage is to be avoided this winter. Having established the certainty of this fact, the Fuel Administrator has placed the difficult task of securing this production in the hands of James B. Neale. Mr. Neale has been placed at the head of a new section of the Fuel Administration, which is to be known as the Production Bureau.

While the weekly average production is now running over eleven and one-half million tons a week, it is now clearly apparent that a weekly average of a million tons more must be maintained from now until the end of next winter if the greatly increased demand for coal is met in its entirety.

The Shipping Board estimates that 30 per cent. more coal will be required for bunkering purposes than in 1917. Expansion of war industries will call for 18 per cent. more coal in 1918 than in 1917. Public utilities will call for 15 per cent. more coal. Thirteen per cent. more coal will go to domestic consumers, while the railroads must have at least 7 per cent. more coal than they had last year. The details of the Fuel Administration's estimate of the requirements are shown by the following:

	1917 Amount	1918-19 Amount	Per Cent. Increase 1918-19 Over 1917
Industrial	204,907,000	242,024,000	18
Domestic	66,915,000	75,678,000	13
Gas and electric utilities	33,038,000	37,941,000	15
Railroads	155,000,000	166,000,000	7
Exports	24,000,000	24,000,000	0
Beehive coke	52,450,000	52,450,000	0
Bunker—Foreign	7,700,000	10,000,000	30
Bunker—Domestic, including Great Lakes	5,000,000	5,000,000	0
Used at coal mines for steam and heat	11,000,000	12,500,000	14
Total	560,010,000	625,594,000	12
Used from storage	4,375,000	.....	....
Exports	907,000	.....	....
Estimated production	554,728,000	.....	....
Substitution of coal for oil, mainly in west	.....	2,000,000	....
To increase stocks of industrial plants and public utilities outside of New England by ten days' supply	.....	7,000,000	....
Total requirements for 1918 without allowance for estimated conservation	.....	634,594,000	....
Production 1917	554,728,000	.....	....
Production 1918 required for needs	634,594,000	.....	....
Increase required	79,866,000	.....	....
Percentage	.....	.....	14.4

The Fuel Administration has moved into its new building at New York Ave. and 20th St., Washington, D. C. The entire Fuel Administration now is housed under one roof.

Weekly Production Statistics

Despite a generous car supply coal miners at many properties insisted on observing Memorial Day. This resulted in a slump of more than a million tons in production during the week ended June 1. Total bituminous production during that week was 10,774,000 tons. Anthracite forwardings, largely for the same reason, decreased 22 per cent. Total shipments were 31,762 cars.

Beehive coke production fell off 7.7 per cent. during the week ended June 1. Total production was 612,000 tons. Byproduct coke production for the week ended June 1 was 479,776 tons, a decrease of 4626 tons as compared with the week preceding.

The figures used above are based on estimates made by C. E. Lesher, the geologist in charge of coal statistics for the United States Geological Survey.

Movement of West-Bound Coal Further Restricted

Further restrictions are to be placed on west-bound movement of eastern coal. An order effective June 20 has been issued prohibiting west-bound movement from all mines located on the Chesapeake & Ohio in the Kanawha district from St. Albans, W. Va., eastward. The movement to Indiana of any high-volatile coal from the Kanawha and Kenova-Thacker districts of West Virginia and the Big Sandy district of Kentucky will be prohibited.

Warns Against Unnecessary Use of Electricity

United States Fuel Administrator H. A. Garfield has warned the public against prodigal and unnecessary use of electricity for outdoor advertising purposes and other display illumination.

The Fuel Administrator said this waste must be stopped. Unless official reports show that display illuminations are kept within reasonable bounds, and are limited to the hours of darkness, the suspension of the so-called "lightless night" order will be revoked and even more stringent restrictions will be ordered against all forms of outdoor lighting and display illumination. The consumption figures recently compiled reveal the necessity of the utmost economy in fuel during the summer as well as the winter, and require the early enforcement of the strictest economy of all fuel-generated electricity.

Coal Exports During April, 1918

Exports of bituminous coal, during April, show an increase over the corresponding month of last year. In April of 1918 exports were 1,554,579 tons. This compares with 1,389,899 tons in April of 1917. Anthracite exports show a decrease. In April of this year 340,783 tons were exported, whereas in April of 1917 exports were 586,367 tons.

Increased exports were shown to the following countries:

	April 1917 Tons	April 1918 Tons
Canada	912,653	1,127,705
Cuba	112,802	212,355
Panama	48,094	70,870
Uruguay	4,329	6,107

Decreased exports were shown to the following countries:

	April 1917 Tons	April 1918 Tons
Italy	72,771	2,016
Mexico	16,161	12,675
West Indies	35,941	28,063
Argentina	31,612	9,869
Brazil	51,807	25,097
Other countries	103,729	59,822

Coke exports in April of 1918 were 141,003 tons. In the corresponding month of last year they were 79,759 tons.

Reduction in Carload Prices from Lake Docks

Reductions have been ordered by the Fuel Administrator in prices charged for bituminous coal shipped in carload lots from Lake docks. The new prices are: Coal from Youghiogheny, Fairmont, Greensburg, Westmoreland, No. 8 seam Ohio, Hocking and Pomeroy fields, lump $5.80; run-of-pile, $5.55; screenings, $5.30; Harlan, Thacker, Kenova, Kanawha fields, lump, $6.30; run-of-pile, $6.05; screenings, $5.80; Pocahontas, New River and Tug River fields, lump, $6.30; run-of-pile, $6.05; screenings, $6.05.

The order provides that any increase in freight rate may be added to the prices. Licensed jobbers are allowed a margin of 20c. a ton for handling coal from the docks

L. A. Snead Resigns

L. A. Snead, who has been associated with the Fuel Administration since its foundation, has resigned. For some time, Mr. Snead was in direct charge of the important work of apportionment and distribution for the Fuel Administration. He served the Fuel Administration as a volunteer.

Freight Rate Order to Be Modified

Important modifications are to be made in general order No. 28 issued by the Railroad Administration. It was this order which made the recent drastic increase in freight rates. Paragraph C of section 1 of that order reads: "All intrastate class rates shall be cancelled where there are interstate class rates published between the same points and the interstate rates, as increased, shall apply." This paragraph, it is understood, is to be modified so as to permit the application of intrastate rates to which an increase of 25 per cent. has been added. Regional directors have been instructed by the Railroad Administration to preserve all existing parities and differentials affecting imports and exports. The regulation providing a minimum charge of $15 for carload shipments is likely to be stricken out.

Rates to "Short-Haul" Territory Found Unjust

The coal rate adjustment from mines in Pennsylvania to "short-haul territory" has been found by the Interstate Commerce Commission to be unduly preferential to Alicia, Bridgeport, Pike and Braznell, Penn. It was also shown to be prejudicial to Diamond. The Commission holds that the rates from Diamond should not be higher than those contemporaneously maintained from mines in the vicinity of other places mentioned. What is known as the short-haul territory is the region including Buffalo, Rochester and Pittsburgh on the east and is bounded on the west by a line running through Lorain, Ohio, and Orville.

Furloughs for Really Indispensable Men

In response to appeals from all over the country the War Department has decided upon a policy that will permit conscripted men who are highly skilled in necessary industries to return to their former employments. The system of furlough will be automatic, and will not in the future, as in the past, leave to the discretion of company and other subordinate commanders the question whether such furloughs should be granted.

An application blank has been prepared by the War Department known as the "Application for return of enlisted man in highly skilled class of labor to necessary industry." The application when filled must state the direct Government contracts held by the applicant or the names of the persons having such Government contract with whom contracts have been made by the applicant. The applicant must add a statement that the status of his business as a "necessary" industry has been filed with the district board. The application must be duly sworn and a Government inspector conversant with the facts must sign the papers.

The signed application then goes to the Adjutant-General's office with a request from the interested Government department stating that it desires that the man be granted an indefinite furlough without pay. The employer makes a promise that after the need for the man's service has passed he will be returned to the Army and the Government notified.

While on furlough he will not be allowed to wear the uniform. Every month the company employing such men must furnish the Government a report that such men are still in employment and state the class of work they are engaged in. In case such men leave their employment the employer must immediately notify the Government.

John W. Poe, of Roswell, N. M., has been appointed fuel administrator for his state. He succeeds W. C. McDonald, recently deceased. Mr. Poe is president of the First National Bank of Roswell and is a member of the state tax commission.

THE LABOR SITUATION

General Labor Review

While the patriotic purposes of the bulk of the miners and other mine workers have made strikes infrequent and short, other causes for tonnages below capacity still remain. There is an important minimum of mine workers everywhere who are not patriotic enough to work day after day. They satisfy themselves by working just enough to make a living, and when that is achieved, or appears likely to be achieved, they absent themselves from the mines or work short hours.

This absenteeism is quite a serious matter and the method to prevent it taken by the Lehigh Valley Coal Co., illustrated and described elsewhere in this issue, is certainly worth imitating. There are enough patriotic men in every colliery to put this plan in circulation and surely it ought to be done. It is a sign that a man has not bought as many Liberty Bonds as he can carry if he is "lazing" away his time when the mine is working.

Unions Should Squelch Mine Absenteeism

In places where the union is strong, the unions themselves should take up this matter. One hundred per cent. working and 100 per cent. production by those who are working is what the country needs and has a right to expect so long as the war lasts. Steady work made an aim in itself, duly recorded and posted at the mine, will correct many of the evils that now need correction. Many of the men who refuse to work more than half time can prove to the satisfaction of everybody that at the existing rate of pay they cannot buy bonds and support their families. Once they work with 100 per cent. regularity and with 100 per cent. of energy they will find they are capable of helping their country in much larger measure.

The United States Fuel Administration is very wisely endeavoring to stir up that enthusiasm which alone can meet the difficulties and sweep away in its powerful current, strikes, absenteeism, holiday making, inefficiency of day men and underproduction of miners. Coal production is one of the most worthy occupations of all those pursued by civilians behind the fighting lines, and, duly presented, this fact will not fail to do its work.

The administration's speakers at a recent meeting at Jamison No. 2, near Greensburg, Penn., were Sergeant Major J. Armstrong Young, of Virginia, a member of the Canadian Heavy Artillery; Alfred Korzybski, of Warsaw, who was a staff officer in the Second Russian Army under the Grand Duke Nicholas of Russia, and Lieutenant Klymnecky, who also served with the Russian Army. The first of these, the Virginian, served in France for 21 months. He was wounded twice and gassed at Vimy Ridge.

Funeral Layoffs Still Slow Down Business

An unfortunate idleness at the Stanton Colliery of the Lehigh & Wilkes-Barre Coal Co., June 8, illustrates the fact that some men are not any too anxious to work. This company announced some years ago that it would pay $100 to the family of any mine worker killed if the men at the colliery would work on the day of the funeral. It had been the custom to lay the mine idle on the day of the ceremony though only a few attended the funeral. Of course, the pall bearers and the kin of the deceased were allowed to keep the day in the appropriate manner, but still attendance was in the main restricted to these men.

However, when the legislature recognized the fact that it was well that every employer should indemnify the families of those killed in his service by a larger indemnity than $100, the Lehigh & Wilkes-Barre Coal Co. paid the larger amount and that only. The men do not recognize their obligation now to keep at work and think that by celebrating the funeral by an abstention from labor and by shutting down the mines they can force the coal company to pay $100 extra to the families of mine workers killed at duty.

As against the action of these Lehigh & Wilkes-Barre Coal Co. men may be set that of the men of the Lehigh Valley Coal Co. By the way the Lehigh Valley men are always loyal to the nation and leaders in loyalty, wherever you find them. Strange to say, the men who show the characteristic most markedly in the week's news are the men at the Broadwell Colliery, at Moosic. The public never speaks without displeasure of Moosic and its neighboring towns in the south. It is the home of the Industrial Workers of the World. Its neighbors are Avoca, Dupont and Old Forge and other towns which are peopled by strange men of Bolshevic tendencies, men with eruptive follies of every kind. But the Broadwell Colliery is the first oasis beyond a land of trouble. The broad-gauged policy of the Lehigh Valley Coal Co. may have something to do with this.

Want to Work Sunday for American Red Cross

This colliery has worked every day except Sundays, Christmas and New Year. It has also asked to be allowed to work some one Sunday, celebrating it as a "Red Cross Day," the proceeds of its earnings to be turned over to the American Red Cross. The men have unitedly gone on record against any and all miners who feel inclined to stop work on any pretense, and they indignantly repudiate any "slacker" charges made against the mine workers in the anthracite region. And now they have taken the further step of opposing the drafting of men from the anthracite mines until the present scarcity of men comes to an end, and that end unfortunately is nowhere in sight.

They are absolutely right in this stand. If it is justifiable for the United States Government to take 6000 lumber men out of the New National Army to cut spruce for airplanes, as has been done—and justifiable indeed it is—surely it is right to keep enough men in the anthracite industry to supply at least the minimum of coal needed for the conduct of our national life and war industry. A maximum output cannot be secured if the 145,000 men now trying to get out the coal needed is to be further reduced by the draft. Already 32,000 men have been taken from the anthracite mines since the war began.

Supreme Importance of Anthracite Production

It is essential that the coal production be maintained in that field of coal which is nearest to the great national gateways and the leading national industries. The East has altogether too many war factories. The railroads cannot supply them with the needed transportation and consequently the extension of these factories will not be permitted. Their operation, however, is needed at full strength, and that operation will be found impossible if the anthracite field near by them has a reduced output and as a result the domestic coal used by the industrial workers and the steam coal used by the factories has in larger measure to be brought even longer distances than heretofore over the overburdened national roadways.

The miners in general have not, so far, sought exemption because it appeared on its face unpatriotic and cowardly, and there is nothing that the miner more bitterly resents than an aspersion of his patriotism and his bravery. The coal-company officials, fully realizing the national needs, were willing to sign exemption papers, but the mine workers did not present them for signature to their employing companies even when the former were prepared to ask, and did ask, exemption. They frequently had the request for exemption signed by a "buddy" or a neighbor.

And, furthermore, the officials of the draft boards, realizing that it would be impossible to obtain a quota in the anthracite region without taking mine workers, were but little disposed to exempt anyone or place anyone in the deferred classification, no official recommendation to that effect being in existence to justify such an action. Captain W. A. May, president of the Pennsylvania Coal Co., states that his company lost 265 men to the draft last month and that the situation is quite serious. The shortage of men in the mining industry of Lackawanna County is 7932, out of the 35,744 men employed in the coal industry of that county. It is easy to see how the work is hampered.

Action though deferred is coming at last. Acting under the instructions given at a conference at the state draft headquarters which occurred June 6, most of the coal companies have filed exemption claims for those men who are scheduled to leave either June 24 or in future drafts. The local draft boards have been informed that they have authority to commend deferred classification for miners and to reopen cases of such workers on the same basis as railroad men and farmers. The conference was attended by Major W. G. Murdock, chief draft officer; Seward E. Button, chief of the Pennsylvania State Department of Mines; George F. Buss, sheriff of Luzerne County; James M. Donnelly, former mayor of Pittston; George P. Gallagher, district superintendent of the Lehigh Valley Coal Co., at Pittston, and H. R. Johnson, superintendent, Lehigh Valley Railroad Co.

The strike at Honey Brook No. 5, of the Lehigh and Wilkes-Barre Coal Co., mentioned in the issue of last week, ended June 6, the 12 men who would not pay their union dues being discharged. Whether they were really Industrial Workers of the World or not has been a matter for argument. But this much is certain, the I. W. W. did try to establish itself at McAdoo and Tresckow, nearby towns to Audenried, where the Honey Brook operation is located. They could not obtain meeting quarters and they had to meet in the woods near McAdoo. This marks the failure of the first and, let us hope, the last attempt to build up the "I Won't Works" in the Lehigh field.

Ohio Men Want No Foreigners in Union

The miners in parts of Ohio are determined to make the mines 100 per cent. American. The largest local union in Ohio, that comprising the miners at Webb mine, Bellaire, has resolved that every miner have at least his first naturalization paper or forfeit membership in the union.

Its action will probably not lay off any men, for few foreigners have arrived in America since the war started and so all have had a chance to declare their intention. But, as has been stated, the spirit of Americanism is not conferred by naturalization, and lacking it the naturalized foreigner is like the unconverted reprobate at the mourners' bench. If he is disloyal he is likely to create a scandal sooner or later. It is not well to try to convert anyone to anything by offering the "loaves and fishes" of a job.

Unionization is progressing in the Fairmont region of West Virginia under the sanctioning provisions of the recent contract. The mine workers of the large "New England" mine of the Consolidation Coal Co., at Watson, W. Va., were recently organized by the United Mine Workers, between 200 and 300 joining the union. The organizers were C. H. Bradley, an international representative, and C. F. Keeney, the president of District No. 17, with James Diama, whose work it was to round up the Italians.

The new plan is not working as smoothly as hoped. It had always been feared by those who opposed the union that the Colorado system might prove to be a plan under which the union would be recognized, instead of one in which the union is allowed to exist, but is not permitted to make a contract. In West Virginia it appears that the mine workers of some places chose the same men for union leaders as they had selected for their representatives under the contract. The company is therefore dealing with an organized opposition backed by the funds of mine workers throughout the country. That fact was to be expected.

The Consolidation Coal Co. has graciously submitted to the inevitable. Frank Keeney, the president of District No. 17, declares that he has 3500 members in the vicinity of Fairmont and that at two mines the men would not organize although urged to belong to the union by the superintendent. Mr. Keeney says that the operators have been extremely courteous to himself and to "Mother Jones."

After all, the union starts its existence with friendly feelings where bitterness might well have been expected. The Consolidation Coal Co. wisely realizes that the union should either be a friend or an enemy. The company has elected to be friendly to the union, and it is quite probable that it will find the union will reciprocate. Most companies sign up with the union and then refuse to bury the hatchet. They do all they can to maintain the hostility. The better plan is to try to get along with your partner if you know or believe that he is to be your partner for life.

Operators in the Illinois fields are complaining of the increasing difficulty of getting men to work in the mines and in keeping them at work when they get them. The trouble is not so much desertion of the industry for other lines of work, although there is some of that too. Principally it is the disinclination of the miners to work regularly when they can make a living by working only part of the time.

Patriotic Workers Round Up Rest

Anti-slacker committees made up of anthracite miners bent on singling out their fellows who are taking days off without legitimate excuse, are at work at the mines of the Lehigh Valley Coal Co. They are an answer to a patriotic appeal that the officials of the company have made to the employees urging them to eliminate unnecessary absence from work during the present grave labor shortage in the anthracite fields.

TO KEEP TRACK OF THE MINE SLACKER

"The results are already better than we had dreamed," said President E. E. Loomis. "Following the 'Four Minute Man' idea, we are having good speakers talk to our people, pointing out existing conditions and appealing to them, from patriotic motives, to coöperate with us to their fullest extent that a maximum coal output may be attained. At every colliery we have erected giant thermometers which show the tonnage produced by that colliery each day as compared with its best record, and alongside are the names of absentees with an estimate of what the tonnage would have been if all had been on the job. The effect is electrical. Practically every man has been put on his mettle, and there is a general demand by the men to be put on these 'slacker' committees."

EDITORIALS

HEAVY and unequal taxation has been so oppressive in Turkey that it has always served to prevent that country's development. Such taxation is proposed for the United States by persons of undoubted patriotism. But no matter how patriotic they may be, the reasons for objecting to extremely high taxes on essential industries are by no means unpatriotic. Without dogmatically assuming any unusual certainty on these matters, it may be well to state the arguments of those who are opposed to extremely large taxes. Washington may well have facts permitting of a different point of view to that here taken. So far it has not presented them.

If every man had his money and time invested in a single enterprise, and the Government took 90 per cent. of his profit, he would be left with 10 per cent. and might be well content. He would say it was the war, and admit the justice of the tax. But men are not engaged in only one line of endeavor. Most wealthy men have a large number of industrial investments. Some are losing ventures and some are prosperous. The investor balances one against the other and in normal times shows a satisfactory balance.

* * *

NOW heavy taxation upsets that balance. The prosperous businesses make a tenth, let us say, of what they did before the taxes were raised and considerably less than before the war because of price regulation, while losing ventures—and there are not a few of these—are in more desperate straits than ever. Clearly, then, the investor does not merely give 90 per cent. of his income to the Government. The Government gets 90 per cent. of the earnings of his successful investments, while the investor gets his 10 per cent. and loses steadily in the conduct of all his other business.

The investor is on the way to penury. It is clear that he will run no risks whatever in the future. He will buy Liberty Bonds and keep out of danger. But who will make the munitions under such circumstances? There is but one reply—the Government. It is inevitable that when the Government gives the manufacturer a minimum of profits and lets him shoulder the losses unassisted, no one will want to undertake the risk. In Great Britain the outcome of high taxes on necessary industry has been Government factories.

* * *

IF, HOWEVER, any industries should be marked out for destructive taxation, clearly those chosen should be the luxury industries. Obviously the manufacturer of unnecessary articles should pay the higher tax, and not those war industries which are performing an essential service.

There is a large degree of Bolshevism abroad in this and other lands. It existed long before the word Bolshevism was coined, and long before the war commenced in Europe. Great Britain has been affected by it from the start. The belief was that commercialism started the war and that the gun factories and steel industries desired the struggle in the hope of enriching themselves. What more natural decision, then, than that which was made—the decision to prevent these industries from profiting by the war they were alleged to have started?

Even though the Allied governments knew that the industries were not guilty, yet it seemed necessary to appease those who believed with the fervor of fanaticism that the guilt was proved to the hilt. The politicians, especially in Great Britain, well argued that they could not save their faces if the war industries in the warring countries profited generously from the struggle.

* * *

SO THE burden of taxation was put on them, though these much abused industries were the nation's real defenders. In fact nothing was more necessary than that they should increase in numbers and activity. To this end it was needful that they be enabled to secure capital. Strange to say, a fair profit does not insure the rapid growth of an industry, for an industry grows almost wholly from the inside outward.

A man whose business it is to sell ribbons will not enter the steel industry no matter how prosperous it may be. He may invest a little money there, but industry chiefly grows from the reinvested earnings of its own capitalists. They have the knowledge needed and they desire to invest their money in their own industry. Tax that industry higher than other industries and you not only remove the means for expansion from the industry in question, but you make the capitalist leave the essential industry for one less essential and thus your Bolshevism proves to be your undoing.

* * *

AS FOR the taxes on luxuries that have been proposed, they are, perhaps, desirable; but more important are taxes on the profits of those industries that manufacture luxuries. So long as luxuries are advertised they will be sold. It will be represented that the spirits of people must be stimulated, that the home fires must be kept burning, that good cheer is as important as military service, and every possible excuse will be made for the unnecessary expenditure of money.

Over-tax the luxury industry, and the luxuries will cease to be flaunted in the eyes of would-be buyers, and the public will give them up without a qualm. The home fires will burn just as vigorously and on less expensive and less labor-wasteful fuel. The luxury advertising of the luxury producers is the cause of half our heartburnings, and it acts as a diabolic reproach to every one who has loaded up on Liberty Bonds and paid generously to the Red Cross. "The sacrifice," it seems to say, "was not necessary. Only a happy, well-fed, prosperous family at home will be able to hearten the warrior for the fray, and here you have been skimping till your heart is dead within you. Cease saving for Liberty Bonds. Buy a piano-player on time."

THE luxury trade shouts from every car advertisement and shop window that the army needs your spirit as much as your money. Fine clothes tone up the spirits; a bracing trip in an automobile elevates the flagging heart; a trip to Palm Beach renovates a run-down system, and so on.

Tax the luxury industry and you will remove such temptations and allay a large amount of discontent. What reason is there that in a world war unessential industries should be the only ones free from price regulation? What logic is there in permitting them to be exempted from special taxation? Their prosperity is certainly as conspicuous as that of the war industries; in fact it seems far more conspicuous and less justifiable.

Reasons for the defense of these industries from taxation and control are not so much reasons as excuses. Patriotic people are trying to avoid investment in luxury trades. When investors improperly succumb to the temptation that the large dividends paid by these stocks afford are they to be further enriched by the action of the Government itself, which apparently favors by exemption the luxury industry whenever a decision has to be made as to where the burden of taxation shall lie?

Lantern-Slide Talks for Mine Workers

MANY things to which an operator is entitled he does not get. The workman does not deny that the operator is entitled to them, but because the workman is not trained the operator does not get them. One of these things is a reasonable protection against the fire hazard. The workman knows he should not burn down his employer's property. Incendiarism is usually farthest from his thoughts. Yet because the employee has not been trained to avoid fire hazards the property of the operator is subject to many unnecessary risks. Would it not pay to give the workman and his family training that would make this hazard less menacing?

A little book on "Safeguarding the Home Against Fire," prepared for the United States Bureau of Education and written by the National Board of Underwriters, has just come to the editor's desk. It has 91 pages of excellent type matter, with cartoons which would make appropriate lantern slides and serve as cues to a good lecturer, such as every large mining town should have.

Freedom from accident is another right of the employer. He is, or should be, trying to secure safety. Why should the employee in many cases be creating and not removing hazards? No invidious criticism is intended or even justified. Neither employer nor employee is any too clear about his whole duty to safety. But in the work of securing it lantern slides and a lecturer is the appropriate medium.

Unfortunately lecturing skill is rare, but that is largely due to the lack of opportunity. So few of us have any chance to practice oratory unless we are labor leaders, politicians or lawyers. These people soon develop into real orators, and there is no reason whatever why an engineer cannot be brought to do the work successfully. Unless he is constitutionally ill fitted, he is a good man for the job. Not being in administrative control of the men he is usually in better accord with them than the manager can well be.

Some One Should Make a Start

THE anthracite operators and the Fuel Administration seem to be drifting onto the sunken rocks of the army draft for lack of a firm hand on the rudder. It would be better by far to stop the miners of the hard-coal region from joining the army than to bring them back, as Great Britain did, from the trenches in France.

No one seems to want to draw odium on himself by opposing the draft of these much needed men. Everyone acknowledges that they do a larger work in the coal mine than they can ever hope to do in France, for without coal we might as well give up the struggle. It is also well understood that the culm banks are shrinking and will soon cease to make up for the shortage in the coal mined from the face. But everyone is waiting for someone to rise who will take the burden on himself of making the unpopular proposal that anthracite mine workers be exempted.

Another bold spirit is needed—someone who will ask for the repeal of the Gallagher bill so that men with a few days of intensive training can be placed in charge of a mine breast, as is customary in bituminous mines. No American wants to work two years under a foreigner as a common laborer, especially an uneducated foreigner, and the law is keeping Americans and the better type of foreigner out of the mines.

The act was planned from the first to limit the introduction of labor into the anthracite fields, especially during a strike. It has done that work admirably, but we doubt if at the present any patriotic American, miner or other, feels any admiration for a law which keeps our mines short-handed in the face of the enemy.

The trouble arises from the fact that the Gallagher bill was passed after a long fight. It is a labor trophy, but like the cups and medals won in past contests it must now be cast into the melting pot. There are lots of men around the mine workings and elsewhere who could readily be transformed into miners if the law were modified. We are not at all convinced that there would not be fewer accidents, because in general a greater sobriety and carefulness mark the day worker.

It would seem that the matter of excluding miners from the draft and modifying the Gallagher act should be tackled by the Fuel Administrator himself, with the assistance of John P. White. There are no strikes to break up, and if there were the Gallagher act could be restored to meet such an emergency. Why not pass an act permitting the Governor to suspend the Gallagher act at his pleasure during the continuance of the war? The legislature would take such action if requested by Doctor Garfield.

Furthermore, the draft boards would refuse to accept miners if the Fuel Administration made it clear that acceptance jeopardized the fuel situation and that the prosecution of the war would be seriously hampered if the hard-coal supply failed. But so long as the highest authority is silent as to the necessities of the case, no wonder the legislators and draft officials are in doubt. Some one must take a place at the wheel before it is too late, and the man of all men seems to be head of the Fuel Administration. It is gratifying to read that Doctor Garfield has already taken some steps and that operators, draft officers, mine workers and the public are being gradually aroused to the great necessity.

Uncle Sam is Commandeering Steel

UNCLE SAM TO THE STEEL PRODUCTS CIVILIANS:
"Some of you will have to fall in behind the boys at the camp, so get busy!"

If we don't want to use wood rails and wood ties, we must take good care of the steel rails, steel ties and steel spikes now around the mine. Keep them out of sulphur water and lift them before the roof falls on them.

DISCUSSION BY READERS

Waste in Lubrication

Letter No. 1—In frequent visits to the different coal fields I have been struck with what, to my mind, is a serious detriment to the successful operation of any coal mine, to say nothing of the great waste of material and machinery that results from a practice that is inexcusable from the standpoint of efficiency.

In this letter I will confine my remarks to one subject only, regarding which all practical mining men will admit there is an unwarranted waste; namely, the lubrication of mine machinery and equipment. In the large majority of mines this work is done in the most slovenly manner. Not only is there a great waste of the lubricant, but efficient operation is impeded and loss inevitably results.

Before proceeding further, let me say that there appears to be a most woeful lack of information and, I may add, also, of intelligence on the part of many men in charge of mine operation and equipment requiring lubrication. I am at a loss to say whether the operating officials are more to blame in this matter than are the manufacturers of lubricants, for their failure to disseminate needed information in regard to the proper use of their products.

Recently, I observed a plant in West Virginia where the general superintendent, who is supposed to be a thoroughly high-grade man, compelled his employees to use a low-grade oil commonly known as "black strap" to lubricate, or I might better say, to *smear* the bearings of their mine fans, trolley locomotives, hoisting and winding engines, and mine cars. The use of such a lubricant takes one back several years in mining practice, when it was practically the only oil used about a coal mine, but which is today largely supplanted by higher-grade lubricants.

THE BEST EQUIPMENT CHEAPEST IN THE END

In my wanderings I have observed instances where air compressors have frozen stiff, because of the use of a wrong kind of lubricant. Hundreds of thousands of mine-car wheels have been gouged out in the hub, because of improper or insufficient lubrication. The purchase of any kind of cheaper lubricant other than that adapted to the purpose intended is the most expensive in the end. The best motor one can buy, the best type of mine-car wheel and bearings, will certainly fail when a proper lubricant is not employed, and the loss to the operator will often amount to thousands of dollars in a year's time.

The saving of lubricant at this time is a most vital question, inasmuch as the supply barely exceeds the demand. Yet when one goes about the coal mines it is a common thing to find the floor of the tipple, or the shaft or slope bottom, coated with the drippings from wheel hubs. At times the timbers will be covered almost an inch thick with a cake of the lubricant, which has become mixed with the dirt and dust of the mine and hardened. Likewise, the cars, wheels and axles are caked with the same deposit, which means not only a waste of lubricant but a loss of power in hauling trips.

While such conditions prevail at a large number of mines, the same is not true at mines where the management has given more attention to the selection and use of a proper lubricant. In the majority of such cases I have found that the mine cars in use are equipped with roller bearings, which permit of the use of a higher grade of lubricant. The use of grease to lubricate this type of bearing avoids waste both of material and labor in its application. At such mines it is rare to hear of a bearing giving trouble.

Believing that this is a vital question in mine management, I hope that it will receive the attention it merits and be discussed by practical men who can throw much light on the subject by giving their experience in the lubrication of mine equipment. OBSERVER.

Pittsburgh, Penn.

Gathering Motors

Letter No. 5—Perhaps *Coal Age* can find space, in its interesting columns, for another letter on the subject of gathering motors, from a man who has tried all three of the types of locomotives mentioned in previous letters.

Before coming East in the employment of the Fuel Administration Board, I had charge of a small mine in Pennsylvania, where, a few years ago, a trolley locomotive was installed to take the place of mule haulage on the main roads. We still used mules for gathering coal at the face, but found that the new machine greatly accelerated the work of hauling the coal out of the mine, and I felt that we had made a step forward.

It was with much pride that we watched the trolley locomotive, the first day, as it rolled into the mine, only to emerge a little later with a loaded trip of cars. Every man in the mine was glad to be rid of the troublesome mules, on the haulage roads, and the advent of the locomotive in the mine was hailed gladly and quickly proved to be an efficient part of the equipment.

Two years went by, and I began to consider a further improvement of the haulage system, by the adoption of complete motor haulage, from the face of the coal to the tipple. After a little investigation, naturally, the storage-battery locomotive appealed to me as the best type of machine for this work, because of the ease with which it could enter the low workings.

Someone now told me, however, that battery locomotives were not economical on long hauls with heavy loads; and, regarding it as impracticable to extend the trolley system to the working faces, I compromised and bought a combined trolley-battery locomotive, being fortunate enough, as I then thought, to sell my trolley locomotive at a good figure.

As time went on, however, results convinced me that I had made a mistake in the choice of this machine, which was fast proving a disappointment. As has been explained clearly by the writer of Letter No. 3—the man with a distinguished name—while the battery locomotive is theoretically ideal, in mine haulage, certain electrical considerations and requirements make its use unpractical. I learned by experience that these two types of locomotives cannot be combined without a serious sacrifice of the good qualities of both types.

A year passed, and I became convinced that it was necessary to take further steps to improve the haulage system in our mine. I removed the batteries from the machine and replaced them with pig iron to give the necessary weight to enable the locomotive to haul its load. I then used the machine as a trolley locomotive, on the main road only, and bought two small storage-battery locomotives for the gathering haul. These machines proved very efficient as they could go wherever track was laid, without the expense and labor required to install a trolley system.

The trolley locomotive operating on the main road handled heavy trips that would have drained the batteries had they been employed to supply the power. My story may seem long drawn out, but I believe that there are many other operating men in charge of small mines who must find by experience, as I have done, what equipment is best suited to the conditions in their mines. There was one further development that was important, as it has proved by several years of successful operation to have effectively solved the haulage problem in that mine.

Advantage in Roller-Bearing Equipment

Having heard that a neighboring mine was using storage-battery locomotives, not only for gathering cars at the face, but for the complete haul, from the face to the tipple, I went to the mine to see what type of locomotive they were using that would stand up to that work an entire shift without midday charging. Much to my surprise, I found that they were using the same make of storage-battery locomotive that I had installed at our mine.

Further investigation showed, however, that their mine cars were equipped with roller-bearing wheels, which enabled the locomotive to make the long haul without a serious drain on the batteries. The superintendent told me that he had never found it necessary to charge the machine except at night.

Impressed with these results, I returned home and began at once to make the change from plain bearings to roller bearings, on a few cars at a time. The result is that my two storage-battery locomotives, today, are performing successfully the entire work of hauling the coal from the face to the tipple.

The experience I have narrated convinced me that where the mine cars are equipped with roller bearings, a storage-battery locomotive can be used to haul the coal from the face to the tipple more economically and conveniently than any other type of equipment. Let me say, in closing, that practical mining men should be encouraged to give their experiences in these columns, which cannot fail to be of interest and profit.

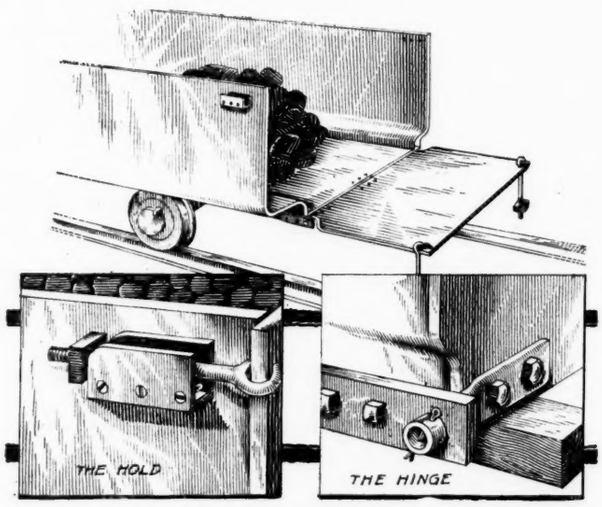
Bayshore, L. I. Steven D. Otis.

Mine-Car Door

Letter No. 1—Replying to the inquiry of V. C. Robbins, *Coal Age*, June 1, p, 1031, kindly allow me to present the accompanying sketch showing the door end of a mine car that may possibly answer Mr. Robbins' purpose and solve the problem he has put up to *Coal Age* readers.

No definite measurements are given in the figure, since the plan submitted is a general one and can be applied to most any low-seam car, with slight change if that is necessary.

As shown in the figure, the door is hinged at the bottom, swinging on an iron bar or steel piping. The details of this are clearly shown in the figure. The two ends of the bar or pipe on which the door swings pass through holes drilled in stout pieces of strap iron and a



DETAIL OF CAR DOOR IN LOW SEAM

cotter holds it in place. The door is further strengthened by an iron strap passing around the bar and bolted to the door at the center.

When the door is raised, it is held in position by a latch on each side of the car. This is an eye-bolt and nut, the eye being bent through a hole in the door, as shown in the figure. By adjusting the nut on the bolt the door can be brought snugly against the end of the car. This arrangement may seem to be crude, but it has proved satisfactory in our case and costs very little to install. H. J. Tracy.

Lakewood, N. J.

[The arrangement proposed by this correspondent is a simple device, but does not provide for the automatic releasing of the door when the self-dumping cage reaches the top of the shaft, as specified by Mr. Robbins in his inquiry. Some of our readers can possibly improve, in other ways, on this arrangement and we hope to hear from them.—Editor.]

Letter No. 2—The inquiry of V. C. Robbins, in regard to a mine-car door that will permit a car to be loaded through the end gate, in working a low seam of coal where a self-dumping cage is used in the shaft, reminds me of a similar instance in my own experience, at a shaft mine of which I had charge.

In that case, we experienced a good deal of trouble from the coal falling back down the shaft when the car was tilted to dump the coal into the screen chute. I may say that, in one day's average run, from 3 to 4 tons of coal had to be cleaned out of the shaft bottom every night.

The miners, of course, loaded mixed coal, large and small sizes together. The style of the cage, which was self-dumping, was the "drop-bottom" type and, as I said, much coal fell into the shaft. We tried various schemes to overcome the difficulty; but still a considerable quantity of the fine coal and slack would find its way into the shaft when the cage was dumped; and it had to be cleaned out once a week.

Double Doors for an End Gate

Finally, I concluded to try a new kind of end gate that I believed would be more suited to a self-dumping cage. Instead of a single door or end gate, I proposed to use two half-doors, each swung on hinges from the side of the car. When closed, the doors would be locked with a catch that could be knocked loose by an automatic arrangement similar to that in use at the present time.

As the cage was tilted, the catch was loosened automatically and the doors swung open each way from the center and prevented the coal from dropping into the shaft, as it was prone to do when the old style of end gate was used.

It may be suggested that the two half doors swinging outward would strike the bottom of the chute when the cage was tilted to its full position. This was obviated, however, by cutting short narrow slots in the floor of the chute into which the ends of the doors sank. The slots were sufficiently wide to allow the doors to fall into them readily and an apron below caught what fine coal went through the slots. The scheme worked fairly well.

Since Mr. Robbins states he is loading only hand-picked coal in the cars, there may be little trouble experienced with coal falling back down the shaft in the manner I have described. Still, I thought the scheme of dividing the end gate in this manner was worthy of mention.

R. W. Lightburn.

Perryopolis, Penn.

Gas Encountered Reopening Mine

Letter No. 1.—In reading the inquiry of J. M. Kemp, who describes his experience in reopening an abandoned mine that had filled with water, *Coal Age*, May 11, p. 894, I was both interested and surprised. Mr. Kemp states that, after pumping out the water he encountered gas that gave a 4-in. cap on a Wolf lamp, but would not explode though the flame was much disturbed in the lamp. He states that he even attempted to explode the gas by black powder, but failed.

To my mind, it is fortunate for him and his companions that the attempt did fail and, to this fact, they probably owe their lives. The first advice I want to give our friend is: Never again attempt to explore an old mine under the same conditions; but, first use some means to obtain a current of fresh air and conduct it into the mine by erecting a brattice in the slope. Permit no one to advance ahead of the fresh air. It would seem that in the former working of this mine, some means must have been employed for its ventilation, although it is stated that there was but one opening, which made it necessary to start a second slope.

Assuming, however, that no available means of ventilation was found, and that it was necessary to ascertain if the mine would warrant being worked, before going to the expense of installing ventilating apparatus, some inexpensive method should have been adopted. For example, it would have been a simple matter to have erected a wooden chimney, say 15 or 20 ft. in height, on one side of the slope mouth and connect this with the brattice forming a return air space in the slope. The cost of doing this would have been small and it would have provided an air current sufficient for the exploration of the mine.

Strange Adventure in a Gas-Filled Mine

What appeals to me as strange is that one could proceed into a mine "a half mile," after having observed a 4-in. cap in his lamp when passing down the slope. In my opinion, there were grave chances of the men being trapped and unable to get back. This may seem harsh criticism, to Mr. Kemp, but it appears to me that he undertook a very foolish task and one that ought not to be repeated.

The explanation given in the reply made to this inquiry is enlightening as to the character of the gas and the reason why it did not explode. However, I understand that a 4-in. gas cap, on a Wolf lamp, indicates approximately 12 per cent. of marsh gas. Then, taking the explosive range of this gas as varying from 7 to 16 per cent. when the oxygen content is normal, it would seem to indicate that the mine air in the slope where the lamp showed a 4-in. cap was highly explosive.

Effect of Lack of Oxygen in Mine Air

It appears to me that the fact that it was not explosive can only be attributed to an insufficient supply of oxygen, owing to the presence of an excess of nitrogen or carbon dioxide in the air. It may be assumed, from Mr. Kemp's description, that there was an excess of both of these gases, which would reduce the oxygen content.

But, when the oxygen in the air is reduced to 15 per cent., lights will not burn; and as Mr. Kemp's light was not extinguished, there must have been at least 15 per cent. of oxygen present together with the 12 per cent. of marsh gas indicated by the 4-in. cap, which would leave 73 per cent. of nitrogen and carbon dioxide in the air. This would be a very dangerous atmosphere to breathe.

It has been explained, in the editor's reply, that flashdamp produces a gas cap that disappears quickly and the lamp flame, is dimmed or may be entirely extinguished depending on the purity of the flashdamp mixture. Mr. Kemp says, however, that the flame cap decreased in height the further he went into the mine until he was forced to turn back.

It seems to me that the cause of the gas cap diminishing the further the lamp was carried into the mine,

and the reason the lamp did not explode, were chiefly due to the lack of oxygen in the mine air, whether this was caused by an increase of nitrogen or of carbon dioxide. JAMES TOUHEY.

Cumberland, B. C., Canada.

[Our correspondent is wrongly informed in regard to the percentage of marsh gas indicated by a 4-in. cap on a Wolf lamp. When testing with a reduced flame, with the Wolf lamp burning naphtha, a 4-in cap would indicate about 4½ per cent. of marsh gas present in the air, assuming a normal oxygen content. With a normal flame, 6 per cent. of gas will cause the flame to reach a height of 3 or 4 in. and be greatly disturbed, twisting about in a weird manner when the oxygen content is normal.

The presence of more or less carbon dioxide in the mine air, as in the case mentioned by Mr. Kemp, has the effect to dim the flame and shorten the duration of the gas cap produced. The amount of the dimming of the flame and the duration of the cap will depend on the purity of the flashdamp mixture, as we have stated on page 894, in reply to this inquiry.

Both nitrogen and carbon dioxide are extinctive gases and their presense in the air causes the depletion of the oxygen. It makes little difference, therefore, whether the effect be ascribed to a low oxygen content or an increased percentage of either of these gases.

While nitrogen is a neutral gas, having no toxic effect, carbon dioxide has a distinctly toxic effect; but both of these gases have practically the same extinctive effect on a flame. The characteristics of flashdamp will vary with the constitution of the mixture or the percentage of noxious gases present.—Editor.]

What Caused the Explosion?

Letter No. 3—In seeking for the cause of the explosion mentioned in the inquiry of "fireboss," *Coal Age*, Apr. 6, p. 645, I favor the suggestion made by Oscar Jones, Apr. 20, p. 755; namely, that there probably existed gob fire in some portion of this mine and that this was directly responsible for the ignition of the gas, which it is very natural to suppose accumulated during the period of idleness.

The existence of a gob fire, in this mine, seems all the more reasonable to suppose, because the place where the explosion started is described as the old workings that were wet. Now, since it is stated that "the mine was ventilated wholly by natural means, there being no fan or furnace," it strikes me that these conditions were very favorable to the production of a gob fire.

Especially would this be the case if there was some fine coal and slack mixed with the slate, in the gob. The heating of the gob, under the slack ventilation in the mine, would generate carbon monoxide, which would greatly assist the starting of a gob fire.

From the question of "fireboss," as to whether this was a gas or dust explosion, it is natural to assume that the mine was somewhat dusty; and that, in addition to the gas which evidently accumulated in the old workings while the mine was idle, made the conditions very favorable for the explosion of the gas and dust that I assume and believe was ignited by the fire burning in the gob.

In my opinion, the dust factor is not a slight one, since a small percentage of dust thrown into the air by the first explosion of the gas would generate a dangerous condition for the propagation of the explosion, which might otherwise have been local in its extent. It is my belief that this was both a gas and a dust explosion combined. GASTON LIBIEZ.

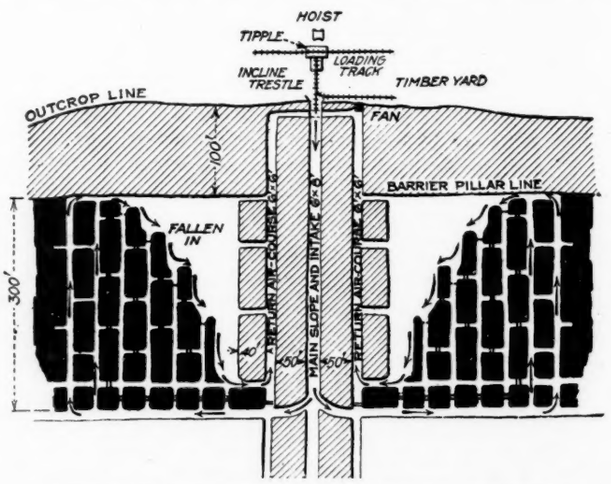
Peru, Ill.

Working 10-Ft. Inclined Seam

Letter No. 5.—A large recovery of coal at a low mining cost, in the 10-ft. seam inclined between 15 and 20 deg., described in the inquiry of "Superintendent," *Coal Age*, Mar. 23, p. 561, will prove a rather difficult problem. The cost of the operation will naturally be the deciding factor in determining the completeness of the extraction or, in other words, the amount of coal that must be left in the ground.

Because of the disturbed conditions in this seam it will not be possible to follow a rigidly uniform system of mining. The success of the undertaking will depend, to a large extent, on the roof coal that must be left up in the first working for the support of the frail stratum overlying the seam.

In considering such a proposition, I would be inclined to estimate on a 400-ton output and assume the worst conditions existing underground. The seam being badly faulted, it will be useless to open wide places. In the accompanying figure is shown the general plan



WORKING THE COAL ON THE PANEL SYSTEM

that should be followed. This consists in driving a single slope on the full dip of the seam. The slope should be 6 x 8 ft. in the clear, after being timbered with 14-in. timber sets spaced 5 ft. centers and lagged with 6-ft. lagging, which will permit of a 6-in. overlap above each timber set. In order to secure a uniform grade when driving the main slope, the line of the slope should be previously prospected by drilling, so as to permit of the construction of a profile for determining the grade of the incline.

When the slope has reached a sufficient depth to provide for a 300-ft. lift below the crop-coal barrier, gangways should be started to the right and left of the slope. As shown in the figure, these should be turned off on an easy curve so that the loads will have

a straight pull as they reach the heavy grade of the slope.

As appears in the figure, a 6 x 6-ft. air-course is now driven up on each side of the main slope, starting from the gangway and leaving a 50-ft. pillar of solid coal, or whatever the state law may require, between the slope and each airway. There should be no crosscuts driven in these pillars; but ventilation should be secured by the use of flexoid tubing while driving the main slope and the air-courses. When near the surface the air-courses must be connected by driving a crosscut under or over the slope and leading to an exhaust fan.

The gangways should be driven 8 ft. wide and 7 ft. high, taking up enough of the footwall, on the rise side, to bring the floor of the seam just above the top of the car. A low car should be used, having a capacity of 3000 lb. of coal. Chutes are then driven to the rise of the gangways, on 30-ft. centers, 8 ft. wide and from 4 to 6 ft. high. About 7 yd. up from the gangway the first croscut or counter is driven between the chutes and made 6 x 6 ft. in section.

Construction of the Chutes

Three rows of props are carried up each chute, the timbers being spaced 4 ft. apart center to center. The middle row should be placed 30 in. from the inside rib row. On two of the rows, nail 2 x 6-in. strips 8 ft. long, to which can be spiked No. 18 sheet iron, 30 x 96 in., so as to form a trough in which the coal will slide to the gangway. Boards 1 x 12 in. can be used for the sides of the chutes. This system requires "bucking the coal," which, if dry, will slide freely on this pitch.

When the chutes have reached the top, bring back the full width of the pillar, or 11 ft. on each side of the chute. When drawing back the pillars only sufficient timber should be used to properly control the roof weight, which will serve to break the coal as quickly as it can be mined and removed. With proper care, the caving of the roof should not be dangerous on this pitch.

A single-drum hoist should be employed capable of hauling two- or three-car trips up the main slope to the tipple. Each trip should be pulled into a rotary dump and the coal dumped into the loading chutes, without uncoupling the rope from the cars. A back switch at the foot of the trestle will enable the handling of supplies from the ground level. Provision should also be made to handle cars loaded with rock, as there will be considerable refuse of this kind to be hauled to the surface. The mine should be equipped with an air compressor having a capacity of 500 cu.ft. of air per minute for operating drills and jackhammers.

Delmar, Ore. SUPERINTENDENT.

Miners and the War

Letter No. 11—The great organized body of the United Mine Workers of America, enlisted so largely in the service army of Uncle Sam, should know and realize their responsibility in the great struggle for democracy in which they form an element as important as the soldiers in France who are working night and day and fighting with magnificent courage. The duty of the one section of this great army of workers is to supply the material that the other needs and must use. The army at home must supply the fuel that gives power to the army in the field.

This is a war of the people and concerns every individual citizen. Upon its issue hangs not only the future of this country but that of the world. The battle is on and must be fought with every energy at our command. Success on the firing line depends on the earnest and effective work at home. Life is the last full measure of devotion that our brave boys in France are offering for their country, and all they ask is the needed support and backing at home that they have the right to expect. United action at home means decisive results on the field of battle.

Responsibility of Home Workers

The great army of mine workers are being put to the test to prove whether or not they possess that spirit of loyal devotion that shall enable them to stick close to their work and produce the coal that is sorely needed in abundance to help us win the war. America has lifted high the ideals for which it is fighting and now looks to its army of industrial workers to strengthen the sinews of war and make it possible to banish forever the autocratic power that has come to be known as "Kaiserism."

The responsibility rests upon every individual, as well as upon every organization of men, to advocate the necessity of an increased production of the munitions of war. We must maintain a deaf ear to the German propaganda with which the Kaiser has assumed to attempt to tie up our industries, and thereby to paralyze the efforts he has been so loath to believe that America could or would put forth in the great struggle in Europe. He has hoped to block our railroads and prevent the sailing of our ships by sapping the work in our coal mines and cutting down the production of coal.

An Appeal to the Loyalty of Miners

To the miner, let me say, Stop, look and listen! Think of the vital importance that an increased coal production is to our country and future life. Upon the miners of America devolves the sacred duty of keeping alight the torch of liberty, which alone can insure justice and peace throughout the world. In the struggle for democracy, let us not falter or count the cost, but work and strive for the preservation of American liberty.

The best news that we can send to our boys in France is that we are behind them to the last minute of the last hour, in thought, word and deed. Knowing this will inspire them with new courage, strength and confidence, and victory is certain.

It is my hope and belief that the great army of mine workers, 400,000 strong, will stand by their guns and keep the coal moving. It is only in this way that we can avoid the future necessity of maintaining an armed force for defense against the incursion of the enemy. Prussianism must be forever put down. Let us live up to our behest that "all men are created free and equal" and continue to live and let live; but, to do this, we must do our part in the struggle in which we are engaged, and our work at home, as miners, is to increase the production of coal.

Plymouth, Penn. JOSEPH R. THOMAS.

INQUIRIES OF GENERAL INTEREST

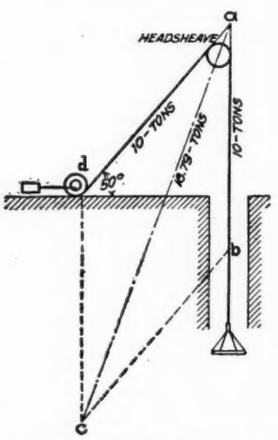
Load on Headsheave

Kindly show me how to calculate the load that is exerted to break the axle of a headsheave when the load on the hoisting rope is 10 tons, including friction, and the rope leading from the winding drum to the headsheave makes an angle of 50 deg., with the horizontal.

MINER.

Cumberland, B. C., Canada.

Referring to the accompanying figure, which shows a load of 10 tons supported by a hoisting rope in a vertical shaft, it is evident that, since the rope passes over the headsheave, the load on each branch of the rope is equal and a force of 10 tons is likewise exerted at the circumference of the winding drum.



LOAD ON HEADSHEAVE

In order to calculate the resulting load on the headsheave, extend the lines of each branch of the hoisting rope, until they meet at *a* above the sheave. Then, from that point lay off, to any convenient scale, the distances *ab* and *ad* to represent 10 tons each. Now, complete the parallelogram of forces *abcd* and draw the diagonal *ac*. The length of this diagonal, measured by the same scale as previously employed, will give the load on the headsheave or the load tending to break the axle of the sheave. This load is calculated as follows:

Since the rope leading from the drum to the headsheave makes an angle of 50 deg. with the horizontal and the other branch of the rope is vertical, the angle between the two branches of the rope is the complement of 50 deg. or 90 — 50 = 40 deg. Again, since the load on each branch of the rope is the same, the resultant *ac* divides this angle equally, making the angles *bac* and *dac* each 20 deg.

From the principle of a parallelogram, $ac = 2ad \cos 20$ deg. Then, since *ad* is 10 tons and the angle *dac* is 20 deg., the load on the sheave is

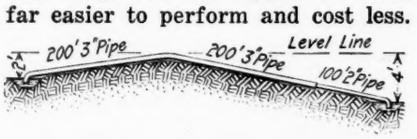
$ac = 2 \times 10 \cos 20° = 2 \times 10 \times 0.939 = 18.78$ tons.

Blasting a Ditch in a Mine

Kindly advise the best method of dealing with the following proposition: We have a slope mine that was driven in about 200 ft. to a point where we encountered some water and made a small local sump. From this point the seam rises about 1 in. in 4 ft. It has been decided to drain this local sump into the main sump by digging a ditch, which will be 2 ft. or more deep, at the deepest place, and 120 ft. long. The bottom is hard and will have to be blasted. Our difficulty arises from the fact that the timber frames, made of 10 x 10-in. timber, are all set on mudsills 4 x 10 in., 9 ft. 4 in. long, and spaced 4 ft., center to center. The ditch must be dug under the mudsills. Can this be done without damaging the timber sets?

Burnside, Penn. GEORGE SMITH.

We do not think that it is possible to blast this ditch out of a hard bottom without disturbing the timbering, and would advise draining the local sump in some other way. It may be possible to siphon the water, which would be far easier to perform and cost less.



In the accompanying figure is shown a successful siphon line having a rise of 2 ft. and a fall of 4 ft., which is suggestive.

Will Carbon Monoxide Support Combustion?

I have just noticed two contradictory statements regarding carbon monoxide as a supporter of combustion. In the "Coal and Metal Miners' Pocket Book," ninth edition, page 350, this gas is described as a "colorless, odorless and tasteless gas." The statement continues: "It is combustible, burning with a light blue flame. . . . Also, a supporter of combustion, being the only mine gas that burns and also supports combustion."

On page 852 of the "Coal Miners' Pocket Book," eleventh edition, I find the folowing statement: "Carbon monoxide, formerly known as carbonic oxide . . . is odorless, colorless and tasteless, and supports neither life nor combustion. It burns with a bright bluish flame and is explosive when mixed with air in the proper proportions." Kindly say which statement is correct.

Cucumber, W. Va. A. G. JOHNSON.

Carbon monoxide (CO) contains no available oxygen and the gas cannot therefore be said to support combustion. A lamp flame introduced into an atmosphere of this gas unmixed with air, if this were possible, would be promptly extinguished. In this respect, the gas behaves the same as methane (CH_4). Both of these gases being explosive when mixed with air in proper proportion, and both being combustible burning in air with a pale blue flame, it would be difficult or practically impossible to introduce a lamp flame into an atmosphere of the pure gas, in either case.

The statement that carbon monoxide is an "odorless gas" is questionable, because the extremely poisonous character of the smallest percentage of the gas in air would make it difficult to judge of its odor or taste.

EXAMINATION QUESTIONS

Tennessee Mine Foremen's Examination, 1918

(Selected Questions)

Ques.—What are the esential elements to efficient mine ventilation?

Ans.—The velocity of the air, the quantity in circulation and the manner in which it is distributed and conducted throughout the mine are the essential elements of efficient ventilation. The quantity of air in circulation must be at least equal to the amount required by the mining law of the state. In addition to this, the quantity of air in circulation must be sufficient to dilute, render harmless and carry away any accumulations of gas and make the mine safe for work. The air current must be conducted so as to sweep the coal face in every working place, besides all void and abandoned places, falls and cavities where gas might accumulate. The main air current must be so divided as to distribute the air to each district of the mine according to its needs and reduce the velocity in each working place so that it will not inconvenience the men or render the place unsafe for work.

Ques.—What instruments are used to determine the condition, volume and temperature of the air current in a mine?

Ans.—The anemometer and a tape measure and watch are required to measure the volume of air passing in an airway. The water gage is used to determine the unit of ventilating pressure or the pressure in pounds per square foot causing the circulation. The hygrometer, or wet- and dry-bulb thermometer is used to determine the amount of moisture in the air and the temperature.

Ques.—Describe how the volume of air in a mine is correctly measured by the use of the anemometer.

Ans.—The instrument is held at arm's length by the observer and in such a manner that its vane will revolve in a plane at right angles to the air current A place is first chosen in the airway where the current will have a straight course and not be deflected unequally to either side, and where the sectional area of the passage can be accurately measured. An effort must be made to obtain as close an average reading as possible, according to the best judgment of the observer, after taking a few preliminary readings at different points in the cross-section. With watch in hand, the instrument is exposed for one or more minutes, and the reading of the dial taken before and after the exposure. From these readings is found the velocity of the air, in feet per minute. The sectional area of the airway, in square feet, multiplied by the velocity of the current, in feet per minute, gives the volume of air passing, in cubic feet per minute.

Ques.—In a mine where 275 men are employed, how many splits in the air current will be required according to law.

Ans.—The Tennessee mining law (Sec. 32) specifies that it shall be unlawful to work more than fifty men and eight mules in any single split or district, except where the judgment of the chief mine inspector decides it is practicable to do this. To work 275 men will therefore require $275 \div 50 =$ say 6 splits of air.

Ques.—At what points in a mine should air measurements be taken regularly, and how often?

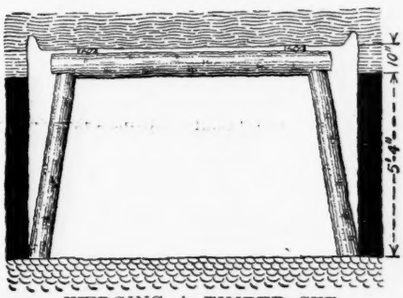
Ans.—Sec. 24 of the law requires the mine foreman to measure the ventilating current each week, at places throughout the mine as designated by the chief mine inspector or the district inspector, and keep a record of the measurements in a book kept for that purpose.

Ques.—An airway 12.9 ft. wide and 8.9 ft. high is passing 50,000 cu.ft. of air per min.; what is the velocity of the air current?

Ans.—The sectional area of this airway is $12.9 \times 8.9 = 114.8$ sq.ft. The velocity of the air current, therefore, is $50{,}000 \div 114.8 = 435.5$ ft. per min.

Ques.—What is double timbering? Show by sketch how you would put up a set of double timbers, and how you would wedge them and why.

Ans.—By "double timbering" is understood a frame of timbers consisting of a collar and two legs supporting it. The manner of setting such a timber frame and wedging the same against the roof is shown in the accompanying figure. The wedges should be driven over the collar a short distance inside of the top of each leg so as to arch the pressure of the roof over onto the legs. No center wedge should be driven, the pressure would then break the beam.



WEDGING A TIMBER SET

Ques.—If you were taking air measurements at a mine and found 25,000 cu.ft. per min. at the intake, and only 4000 cu.ft. at the face, how would you account for this loss, and how can it be prevented?

Ans.—Assuming that the mine is ventilated by a single current of air, and the temperature of the mine air, at the face, is the same as that at the intake where the first measurement was taken, and assuming also there is no gas generated in the mine and no leakage of air through stoppings and doors, the quantity of air passing at the face should be equal to that on the intake. In this case, if there is but a single current, the loss of $25{,}000 - 4000 = 21{,}000$ cu.ft. must be attributed to a large number of leaky stoppings or a door partially set open. The mine temperature is usually somewhat higher than that of the outside air, and the rise in temperature, and the generation of mine gases in the workings, would increase the air volume.

COAL AND COKE NEWS

What Happened in May

[The bracketed figures in the text refer to pages in the present volume, reference to which will give fuller information regarding the matters discussed in that item to which the bracketed figures are attached.]

May 1—The 45c. allowance is conceded to the coal operators of Alabama, but will only be in effect from May 15, when the wage increase granted Apr. 21 becomes operative—The Department of Mines of Pennsylvania declares its intention to enforce the law prohibiting women from doing anything but clerical labor about the mines [841, 859, 886]—New prices go into effect in Brazil district of Indiana; in Montana; in Macon County, Illinois, at the mines of the Williamsburgh Slope Coal Co., Florence, Fremont County, Colorado; in Knox and Whittier Counties, Kentucky; and Campbell County, Tennessee [883]—A cave-in at the White Coal Co., Pittston, Penn., destroys 20 houses and kills one man and injures another [889]—Parrish Colliery breaker, now belonging to the Lehigh and Wilkes-Barre Coal Co., falls, but without casualties [889]—New concrete breaker is started by Delaware, Lackawanna & Western R.R., Coal Department, near Storr's breaker, Dickson City, Pennsylvania [946].

May 2—Railroad Administration announces that it has let contracts for the construction of 100,000 freight cars—Special convention of mine workers is held at Birmingham, Ala., to consider the recent wage increase tentatively accepted by the union officials for the mine workers in that state.

May 3—Special orders providing for the diversion of coal to New England, issued during the critical period of last winter, are revoked by the Fuel Administration [882].

May 4—First issue of "Saward's Journal," a coal trade weekly edited by Frederick W. Saward, former editor of the "Coal Trade Journal"—End of subscription period for Third Liberty Loan—Collision of cages in Loomis shaft of Delaware, Lackawanna & Western R.R., Coal Department [898].

May 6—Attorney-General Gregory condemns Prager lynching at American Bar Association Meeting.

May 7—Screened and sized crushed beehive coke in Colorado is set at $9.80 per ton by Fuel Administration—Order announced penalizing the New York and Philadelphia Coal and Coke Co. for providing low-grade quality of coal for the bunkering of a Belgium relief steamship—Albert H. Wiggin resigns as Fuel Administrator for New York State [883].

May 8—The shipment of coke produced in the New England States to points outside is forbidden except to Albany, Cohoes, Green Island and Troy, N. Y. No coke other than petroleum coke and crushed coke for domestic purposes may be shipped into the New England States from Maryland, New Jersey, New York, Pennsylvania and West Virginia [933]—Fuel Administration makes preliminary steps in fuel conservation by appointing Thomas R. Brown, of Pittsburgh, Penn., and C. P. Billing, a special staff assistant, to classify and rate plants as to their fuel efficiency [932]—C. P. White is appointed manager of Lake and Canadian coal distribution [932].

May 9—Representatives of the United States Steel Corporation and the independents meet with Samuel Gompers, president of the Federation of Labor, and other representatives of organized labor and the members of the United States War Labor Board, to discuss the principle of collective bargaining whereby the Government will be guaranteed against any interruption in the iron and steel industries during the war—The Fuel Administrator authorizes the employment of fuel inspectors for anthracite coal—George T. Watson announces that the Consolidation Coal Co. will put in force an equivalent of the Colorado Industrial Plan [934, 935, 976, 977]—All the mines of the Broad Top-Huntingdon field of central Pennsylvania but one are on this date found to be on strike [934, 976, 1022].

May 11—Prices changed for Wise and Lee County coal in Virginia and a price set for coke from the Howe plant of the Howe-McCurtain Co. in Oklahoma [933].

May 13—Shipment by way of the Great Lakes of smokeless coal from New River and Pocahontas districts in Virginia and West Virginia to Wisconsin, Minnesota, North Dakota, South Dakota and Iowa is forbidden where the fuel is to be used for domestic purposes. The sale, distribution and use of bituminous coal from Pennsylvania, Ohio, Maryland, West Virginia, eastern Kentucky and Tennessee, shipped by way of the Great Lakes, is prohibited in Illinois for domestic purposes [933].

May 14—Manager and a mine blacksmith are killed and three men injured by the explosion of a powder magazine at the Oliphant-Munson Collieries, Coal Spur, Alberta [987].

May 15—Meeting of operators of the Central West Virginia Operators' Association with a representative of the Fuel Administration. The Association agrees on behalf of its members to put the Colorado Industrial Plan into operation [976, 977]—New scale of wages goes into operation in Alabama [797].

May 16—Grievance strike at the Maxwell No. 20 colliery of the Lehigh & Wilkes-Barre Coal Co., at Ashley, Penn. [976].

May 17—Button strike at No. 5 colliery of the Delaware & Hudson Co., Larksville, Penn. [976].

May 18—Decision of Judge Henry in Dauphin County court in favor of three miners who had been docked for dirty coal. Susquehanna Coal Co. directed to pay them $350 [978]—Fire breaks through into the workings of the Peabody No. 2 North mine [1034, 1083].

May 20—Announcement is made that the railroads will spend about a billion dollars this year for additions, betterments and equipment, said to be approximately three times as much as in any of the last three years [1024, 1025]—Fire at gasoline fan in the mine of the Mill Creek Cannel Coal Co., at Villa, near Charleston, W. Va., smothers 13 men and does much damage [987, 1033, 1106].

May 21—National Retail Coal Merchants' Association holds its first annual convention at Atlantic City, N. J. [986, 987].

May 22—James Brothers colliery near Pottsville, Penn., closed down for shipment of dirty coal [1033].

May 23—The Fuel Administration requires that permission be obtained before opening a new mine and announces that it will require proof that the new mines will not secure laborers for opening and development from other mines and will not add to the difficulties of the Railroad Administration [1021].

May 25—Price of all bituminous coal reduced 10c. per ton, it being announced that the President has ordered the railroads to pay the Government price for coal [571, 779, 839, 885, 975, 839, 1020, 1025].

May 27—Freight rates on coal and other shipments raised roughly 25 per cent. by order of Director of Railroads, McAdoo and the Interstate Commerce Commission. Passenger rates are also increased to 3c. a mile. Railroad gross income should be increased $900,000,000 a year by the new schedules [932, 1020, 1021].

May 28—National Coal Association meets for its two-day session, and before it adjourns votes for incorporation [933]—John P. White is appointed a representative of the Fuel Administration on the Labor Policy Board [1025].

May 29—Fuel Administration prohibits use of coal or oil fuel after June 11 for private yachts except for the purpose of returning the yacht to its home port.

May 31—James M. Orr, president of the Orr Coal Mining Co., of Charleston, Va., charged with having secured an excessive price for coal from the Edison Portland Cement Co. and others, is fined $5,000.

Harrisburg, Penn.

The state compensation board has affirmed the disallowance in the case of Paolis vs. Tower Hill Connellsville Coke Co., in which the question arose whether payment of a hospital bill can be construed as payment in compensation when no agreement was entered into and the claims not made until a year after the accident. The decision was based on the time limit having expired. New hearings were awarded in the claims of Simurda vs. Lackawanna Ry. and Thomas vs. Aetna Explosive Co. In a dozen cases appeals were dismissed.

As a result of an investigation made by a special committee of the Scranton Board of Trade it has been learned that the mines in Lackawanna County are now working with 35,744 employees, almost 8000 less than the number needed to have the mines worked to their fullest capacity.

The investigation shows a big scarcity of laborers. When operated to capacity at least 8800 laborers are needed, but today finds only 4400 such men employed. The percentage of shortage in three branches is: Miners, 14 per cent.; company men, 7 per cent., and miners' laborers, 47 per cent.

Six Pennsylvania coal companies on June 7 asked the Interstate Commerce Commission for $250,000 damages from the Pittsburgh & West Virginia Railroad Co. They charge that the railroad unfairly gave mines, in the ownership of which it was interested, preference over the complainant in the distribution of cars from September, 1917, to March of this year, when they allege the discrimination was removed by the railroad administration.

William Potter, State Fuel Administrator, on June 1 cut the word "anthracite" out of the vocabulary of residents in 29 counties in Pennsylvania. In one of the shortest orders yet issued by the fuel administrator anthracite supplies were denied the following counties during the coal year of 1918-1919: Crawford, Warren, McKean, Potter, Tioga, Cameron, Elk, Forest, Venango, Mercer, Lawrence, Butler, Armstrong, Clarion, Jefferson, Indiana, Clearfield, Huntingdon, Blair, Cambria, Fulton, Bedford, Somerset, Allegheny, Beaver, Washington, Green, Fayette and Westmoreland.

These counties will be denied anthracite of domestic sizes, which embraces pea, nut, stove and egg grades. The principal reason given for the action was that these sections are in the soft-coal mining districts, where bituminous is the chief fuel burned.

Charleston, W. Va.

There was a material slump in coal shipped from the Kanawha district last week, the production being 141,272 net tons, representing a decrease compared with the previous week of about 13,000 tons, the decrease being due principally to an insufficient number of cars, the supply last week being only about 45 per cent. In other words, while the hours lost because of car shortage for the week ended May 25 was something over 800, the hours lost for the week ended June 1 amounted to 1605. Hours lost because of an inadequate labor supply totaled 357 and mine disability, or rather lack of power, was responsible for the loss of 274 hours. During the month of May the total loading for the Kanawha district was 37,620 as against 34,627 empties received, the car shortage for the month almost reaching 3000. Last Saturday, while the supply was almost equivalent to requirements, on Sunday 1227 cars were loaded out and only 868 received. On Monday 1427 cars were loaded out and only 893 received. On June 5 1360 cars were loaded out as against only 902 received.

Complaint is being made by many of the operators that while some of the larger mines are not receiving cars, yet the "snow bird" mines are receiving an ample number. Some of the operators are also at

a loss to understand why one mine in this territory supplying railroad fuel was able to load 4800 tons on Monday, 1630 on Tuesday, 1200 on Wednesday, 2200 on Thursday, 2240 tons on Friday and on Saturday last 1000 tons, when no one else on that day had any cars, it being regarded as a remnant of the old assigned-car system.

Conditions are even worse in the New River field, where the failure of the Virginian power company to supply the district with power is not only proving a blow to the industry but is materially interfering with war plans, since much coal from the New River section is bunker coal. Furthermore, it is defeating the effort to increase the total production for the year at a time when every coal operator is bending every energy to produce enough coal now to prevent a fuel famine next winter. Government agents have been investigating the power situation, but no action has been taken so far as is known here.

A slump is shown in the production of coal and coke in the Pocahontas and Tug River districts for the week ended June 1 due in large part to a shortage of labor, although cars are not as plentiful as they might be. A loss for the week ended June 1 of 26,137 tons is reported. The total tons produced amounted to 428,972. Car shortage was responsible for a loss of 158 hours, but labor shortage was responsible for a loss of 1013 hours.

Fairmont, W. Va.

The car supply in the Fairmont district, which is the Monongah division of the Baltimore & Ohio and the northern end of the Monongahela R.R., which is jointly operated by the Pennsylvania and the New York Central, had a good car supply all last week, with the exception of one day on the Monongahela, when a wreck tied things up. The Baltimore & Ohio car supply has been a full run for the mines, which are short of labor at this time.

Shipping facilities on the Kanawha & Michigan seem to be ample, though that road is much congested at this point owing to heavy Government traffic, affecting to some extent the ability of the Coal & Coke to accept empty coal cars for the mines on its line, since the capacity of the yard at this interchange point is limited. Under the rating of mines on the Coal & Coke between Charleston and Elkins the total number of cars to which all mines on the line are entitled is 259½. The development of mines on the Coal & Coke during the last year has been little short of phenomenal.

Plans to increase the efficiency of the mines are being discussed by the operating committee of the Central West Virginia Coal Operators' Association, and a program is being worked out by which meetings will be held at Fairmont, Clarksburg, Elkins and Morgantown, with the idea of having foremen and bosses gather together for talks which are inclined to cultivate efficiency and increase patriotism.

Terre Haute, Ind.

The car supply to Indiana coal mines for the week ended May 25 showed a further falling off, with a result of a loss of 107,005 tons The per cent. of car shortage was 14.14 and the per cent. of time the mines actually worked was 75.52. There was hoisted during that week a total of 591,078 tons, according to reports to the district representative of the Federal Fuel Administration. The market for domestic coal continues to be large, but slowness of public utilities corporations to stock screenings is interfering with the marketing of domestic coal. As the market for mine-run continues strong, less screening is being done than could be done at this time of the year. The increase in freight rates, which amounts to 30c. a ton from the Terre Haute market to Chicago, is expected to stimulate the market for screenings during the coming weeks. If the public utility corporations do not start storage soon there will be a marked shortage of lump coal.

PENNSYLVANIA

Anthracite

Treskow—The slate banks, which consist largely of the smaller sizes of coal discarded for 50 years, will be loaded into cars by steam shovels and run through the Lehigh & Wilkes-Barre Coal Co.'s breaker at Audenried No. 4 colliery. Officials expect to retrieve thousands of tons of good anthracite coal out of this bank.

Pottsville—The Anthracite Consumers' League, through Frank C. Reese, on June 7 asked the Government experts, who started to check up accounts of coal operators, to pay special attention to the large profits on washery coal. This product is simply scooped up from culm banks and with little preparation is put on the market at the full price for freshly mined coal. They also ask the Government to reduce the price of coal from washeries.

Scranton—Charges that the Delaware, Lackawanna & Western R.R., Coal Department, is removing pillars on an extensive scale in its mine workings under West Scranton have been made in a special report filed with Council by City Engineer Long, who recently conducted a survey of the mine workings. He directly accused the company of bringing about recent costly caves through such action. Engineer Long stated that practically all of the pillars have been removed in the 5-ft. seam of the Hyde Park mine of the company under Grant Ave., and that the miners are removing others.

Bituminous

Phillipsburg—James Stratton & Sons, of Cuba, are now shipping coal from their new Pauline mine, near Osceola.

Connellsville—George W. Deeds, county commissioner of Westmoreland County, is opening a coal mine near Champion, in the Indian Creek Valley. Mr. Deeds purchased 50 acres of the Snyder farm.

Indiana—Mine Inspector Thomas S. Lowther, of this city, has announced the successful applicants at the recent mine foreman and fireboss examinations. The list includes five first-grade mine foremen, three second-grade mine foremen, eight first grade assistant foremen and eight firebosses.

Dixonville—The new mines of the Milbar Coal Mining Co. here have been sold to the Estep Brothers, of Lovejoy, who are operating a large mine here. The new management has increased the force of workmen on the new operation and expects to be shipping coal next month. The mine is located on the Clymer branch of the Pennsylvania and New York Central railroads.

Fayette City—"Black Row," a well-known section of miners' houses here, was destroyed by fire recently. The origin of the fire is unknown, but police are searching for one of the miners, in whose house the blaze started, as he is blamed by the other families with starting the fire. The houses were occupied by five families and were owned by the Pittsburgh Coal Co. Little or no household goods were saved by the occupants.

Indiana—The tipple of the Armerford Coal Mining Co., at Armerford, near here, was destroyed by fire on Monday morning about three o'clock. Ex-Sheriff D. E. Thompson, of Blairsville, president of the Armerford company, preferred charges aginst Martin Maloney, until recently the mine foreman at the Armerford mine, and Andy Smelke, formerly the assistant foreman, for arson. The trial will be heard at an early term of Indiana County court.

WEST VIRGINIA

Lillybrook—A new conveyor line is being installed by the Prince Wick Coal Co.

Rock Bottom—Another mine will be opened by the Rock Bottom Coal Co. as soon as a new power plant is installed.

Millstone—The Elkhorn Junior Coal Co. whose plant is near here, plans to begin the shipment from its mine within the next 30 days.

Point Pleasant—Half a hundred miners' houses will be built in the near future by the Mason Coal and Chemical Co. at Hartford, W. Va.

Amherstdale—A new mine in the No. 2 gas seam is being developed by the American Rolling Mill Co. of this place, under the direction of H. A. Jepson, general manager.

Lumberport—The New Superior Coal Co. is opening a mine to develop 66 acres between Shinnston and Lumberport. A tipple is being erected. The plan is to mine coal by July 15.

Dingess—New openings and haulways are embraced in improvements being made by Andrew Dingess, it being estimated that the capacity of the plant will be increased by 4500 tons when improvements are completed, giving the plant a total capacity of 20,000 tons per year.

Charleston—The Bengal Coal Co., with W. C. Robinson as superintendent in charge, has nearly completed improvements to its drift mine at a cost of $200,000 which will increase the company's output by 25,000 tons a year, giving the company an estimated capacity of 100,000 tons a year. Ten new miners' houses are under construction.

Logan—The McBeth Coal Co., of which John Laing is president, has awarded to the Dravo Construction Co., of Pittsburgh the contract for its new plant on Rum Creek, Logan County. The plant is to be most complete. There will be a slope of 400 ft. and a shaft of 100 ft. of a 5 ft. 4 in. seam of Eagle coal, the company holdings amounting to 1400 acres. In addition to the plant proper 30 four- and six-room houses for miners are to be built as well as a Y. M. C. A. clubhouse and a modern store and office building.

Kingwood—The Preston County Power Co. is an organization which will eventually have a plant near Trowbridge on the Morgantown & Kingwood R. R. for the purpose of maintaining a large central electric power station. The war interfered with putting the existing plans into effect, but the company is going ahead with its mining operations. I. B. Bowermaster, for many years superintendent of Elkins Mine No. 4 in that vicinity, now has the management of the plant. The men can work at the mines and live in Kingwood with present train service.

Fairmont—The South Fairmont Coal Co. which has a capital stock of $150,000, owning in fee 617 acres of coal land in Barbour County, near Century, plans early development. Application for sidetracks have already been passed upon favorably by the Baltimore & Ohio R. R. There are three veins of coal—the Mahoning, Upper Freeport and Kittaning. The Upper Freeport is the tipple-height vein, which will be developed first. The vein is 6 ft. deep at a wagon mine adjoining the tract. John W. Poling is president of the company, M. C. Lough is vice president, C. F. Crane is secretary.

Morgantown—Everything is in readiness for the opening on Monday, June 17, of the sixth annual short course in coal mining which is to be given at West Virginia University. Prof. A. C. Callen, head of the mining department, will be assisted by the mining extension instructors, D. H. Perdue, of Bluefield, and R. Z. Virgin, of Elkins. Mr. Perdue is well known to mining men, having been in the extension work for some time. Mr. Virgin, who came to the University in January, was formerly superintendent of mines for the Wheeling Steel and Iron Co. and is known all over West Virginia and Pennsylvania. An enrollment of about 40 students is expected, and the probability is that this number will be increased by late arrivals.

KENTUCKY

Middlesboro—The United States Coal and Coke Co., operating the Lynch mines at Middlesboro, has the distinction of leading the mines in that concern in the amount donated to the Red Cross, this mine having donated $11,650.

Richmond—Lee, Conley and Claude Congleton, of Richmond, who have been operating a coal mine at Chavies, Perry County, have sold the property to the Bewley, Darsh Coal Co., of Knoxville. The Congletons expect to start new developments on other property shortly.

Barbourville—The Manchester Coal Co. has begun operations on Horse Creek, Clay County, and expects to start running coal about Nov. 1. The company is incorporated with a capital of $40,000. The stockholders are: F. M. Maxey, of Barbourville; M. Miller, Lebanon Junction; W. C. White, Louisville; and L. R. Lam, of Greenville.

Frankfort—The Court of Appeals on June 4 held that circuit courts acting for miners and guardians cannot lease the mineral rights of infants' land beyond the time when such infants reach their majority, and held void the act of 1916 in so far as it granted the power and reversed the Pike Circuit Court in the case of the Tierney Coal Co. against Jake Smith's guardian.

Louisville—About 130 miners, representing almost as many coal companies, were recently in Lexington, where they took examinations in order to receive mine foremen certificates. During the time that the men were in Lexington they adopted resolutions, addressed to President Wilson, in which they pledged themselves to do all in their power to keep production of coal up to the maximum, and endorsing the war program.

INDIANA

Gary—The American Coal and Supply Co., with headquarters at Chicago, has been prohibited from selling coal in Gary, Hammond, Whiting, East Chicago, Indiana Harbor and other northern Indiana points by order of W. S. Fuer, federal fuel administrator of Lake County, Indiana. He alleges violation of Government orders.

Evansville—Matthew Duncan and son David, of Evansville, are engaged in sink-

ing several coal shafts in western and northern Kentucky. Many of the coal mines in the Green River country, in western Kentucky, are being reopened this summer and the coal is being hauled to Evansville on barges. Evansville capital is interested in the development of some of the Green River mines.

Petersburg—The Globe Coal Co., of Terre Haute, Ind., has purchased 450 acres of coal land along Sugar Creek in Pike County, Indiana, and will begin stripping the land to begin operations for coal. The coal tests showed a 5-ft. vein of coal at depths varying from 7 to 40 ft. The price paid was $100 an acre. Contracts have been let for ten new houses on Sugar Creek for employees to live in. The contract for the building of a railroad bridge across Patoka River, three miles west of Winslow, has been let, and also the contract for three miles of track.

Bicknell—The Vandalia Railroad Co. has begun, after the lapse of nearly a year, the double-tracking of its road between this city and Bushrod, a distance of 15 miles. With the extension of the five miles of track laid a year ago to the terminal at Bushrod, the railroad company can handle coal shipped from this city in a shorter time and without interference with passenger traffic. The new track will be ready for use, it is planned, by the time the busy season arrives again this fall. Day and night shifts are being used. The company has experienced great difficulty in securing men to do the work.

ILLINOIS

Clinton—The Illinois Central Railroad Co. has completed a new coal chute at its shops in this city. This chute is modern in every respect and will do several times as much work as the old chute.

Belleville—The first constitutional convention of the newly organized subdistrict No. 7, United Mine Workers of Illinois, will be held here June 17. Forty-five delegates will each represent 100 miners. Belleville will make a fight for the permanent headquarters of the subdistrict.

Carlinville—Test holes drilled on the farm of Mrs. Frank W. Burton, south of here, struck a vein of good quality coal 6 ft. 4 in. thick at a depth of 240 ft., with a satisfactory rock top. A local company has been organized by C. G. McIntosh to sink a shaft at once on the Teal farm just at the south edge of town to supply the local needs. A large acreage has been secured. The mine of the Carlinville Coal Co., which formerly supplied local needs, was sold last winter to the Standard Oil Co., which requires the output and that of three additional mines which are being sunk for its refineries. The local trade is being supplied temporarily, however, by the Standard people.

OHIO

Redfield—The Kehota Coal Co., organized about a year ago by Pennsylvania and Illinois capitalists, will soon start a stripping operation in the thin-vein Hocking district near Redfield. It is planned to have an output of about 1200 tons daily. All the machinery has been ordered and much of it is on the ground.

Crooksville—The C. M. Wilson Coal Co., of which C. M. Wilson is the head, will soon open a mine on the Toledo & Ohio Central near Crooksville. The company holds 106 acres of No. 6 seam at that place. The switch has now been completed and loading will start soon. The output will be sold through the H. W. Jenkins Coal Co., of Columbus.

MONTANA

Roundup—The contract for the construction of 25 four-room houses, a boarding house and other buildings at Mine No. 4 of the Roundup Coal Co., has been let and as soon as completed the company will put a large force of men at work on increasing the production of the mine. By early fall it is planned to turn out 500 tons per day with a probable production of 1000 tons. The present temporary tipple will be replaced by a permanent plant and additional mine cars and other equipment will be purchased at once. An additional electric hoist will be constructed also, and a second power line built.

WASHINGTON

Sedro Wooley—Development work on the coal mine at Cokedale near here has been completed by Superintendent Capt. F. A. Hill, who states that the property will be ready to ship out 300 tons per day as soon as the spur track being built by the Great Northern Railway Co. is completed. The mine will employ 300 men at the start. The property is leased by the Cokedale Coal Co.

Seattle—Fifty tons of the first Alaska coal sent to the outside from the Matanuska coal fields is being returned to the Northland to supply consumers in the Nenana Valley. The coal when it finally reaches its destination will have traveled something over 8000 miles, and yet as the crow flies those who will consume this coal are only 200 miles from where the coal was mined. So much for transportation facilities in Alaska. Owing to the long, hard winters and impassable trails between the Matanuska coal fields and Nenana, it was found necessary to ship the coal out of Alaska to Anchorage and from there to Seattle and thence by steamer to far-off St. Michael, there to be transshipped on Yukon River steamers to the Nenana.

Foreign News

Sault Ste. Marie, Ontario—The Algoma Steel Corporation has decided to further enlarge its byproduct coke-oven plant, and a contract for an additional battery of 25 Wilputte ovens has just been let to the Wilputte Coke Oven Corporation, of New York City, making 50 new ovens now in process of construction. It is expected that the two new batteries will be ready for operation late this year.

Granby, B. C.—Important progress has been made in the construction of a large coking plant, docks, sea-going vessels, a railway and other equipment on which much of $1,000,000 is to be expended by the Granby Consolidated Smelting and Power Co. At Graves Point the company has completed excavation for the coal bunkers and will start work on the superstructure at once. The bunkers will be 52 ft. wide and 300 ft. long and will have a capacity of 12,000 tons of coal. The coal will be transported by vessel from the mines on Vancouver Island, 400 miles distant, now being opened up by the Granby company. Besides coke to be used in its smelting operations the plant will produce gas, also valuable in smelting, and coal-tar products. It is estimated that the company will save 50c. a ton by the use of its own coke.

Obituary

Fred W. Nay, a successful coal operator of Shinnston, W. Va., part owner of the Hardesty & Nay Coal Co., succumbed last Tuesday in a Clarksburg hospital to injuries received in an explosion of a can of gasoline at the company's plant at Shinnston.

Coming Meetings

American Concrete Institute will hold its annual meeting June 24-26, at Atlantic City, N. J.

American Institute of Chemical Engineers will hold its summer meeting June 19-22 at Berlin, N. H.

American Institute of Electrical Engineers' annual convention June 26-28 at Atlantic City, N. J. Secretary F. L. Hutchinson, 29 W. 39th St., New York City.

Illinois and Wisconsin Retail Coal Dealers Association will hold its annual convention June 26 and 27, at Hotel Wisconsin, Milwaukee, Wis.

Illinois and Wisconsin Retail Coal Dealers Association will hold its annual convention June 26 and 27, at Milwaukee, Wis., with headquarters at Hotel Wisconsin. Secretary, Isaac L. Runyon, Chicago, Ill.

American Institute of Mining Engineers will hold its Colorado meeting Sept. 2-7. The tentative plan calls for one day at Denver, one day at Colorado Springs, one at Cripple Creek, an automobile trip to the top of Pike's Peak, one day at Pueblo and one day at Leadville. Secretary, Bradley Stoughton, 29 West 39th St., New York City.

Publications Received

Annual Report of the Mines. Department of Public Works and Mines, Province of Nova Scotia. Unillustrated, 79 pp., 6½ x 9½ inches.

The Storage of Bituminous Coal. By H. H. Stoek. University of Illinois Bulletin. Circular No. 6. Illustrated, 187 pp., 6 x 9 inches.

Bibliography of Petroleum and Allied Substances, 1915. By E. H. Burroughs. Department of the Interior, Bureau of Mines. Bulletin 149. Unillustrated, 123 pp., 6 x 9 inches.

Monthly Statement of Coal-Mine Fatalities in the United States, January, 1918. Compiled by Albert H. Fay. Department of the Interior, Bureau of Mines. Unillustrated, 21 pp., 6 x 9 in.

Monthly Statement of Coal Mine Fatalities in the United States, February, 1918. Compiled by Albert H. Fay. Department of the Interior, Bureau of Mines. Unillustrated, 19 pp., 6 x 9 inches.

Use of Permissible Explosives in the Coal Mines of Illinois. By James R. Fleming and John W. Koster. Bulletin 137. Department of the Interior, Bureau of Mines. Illustrated, 103 pp., 6 x 9 in.

Use of the Interferometer in Gas Analysis. By Frank M. Seibert and Walter C. Harpster. Department of the Interior, Bureau of Mines. Technical Paper 185. Illustrated, 16 pp., 6 x 9 inches.

Effects of Moisture on the Spontaneous Heating of Stored Coal. By S. H. Katz and H. C. Porter. Department of the Interior, Bureau of Mines. Technical Paper 172. Illustrated, 23 pp., 6 x 9 inches.

Manufacturing Opportunities in the State of Washington. By Harry F. Giles, Deputy Commissioner. State of Washington, Department of State, Bureau of Statistics and Immigration. Illustrated, 240 pp., 6 x 9 inches.

Safeguarding the Home Against Fire. Prepared for the United States Bureau of Education by the National Board of Fire Underwriters. Illustrated, 91 pp., 5 x 8 in. A fire-prevention manual for the school children of America.

Percentage of Extraction of Bituminous Coal with Special Reference to Illinois Conditions. By C. M. Young. University of Illinois, Bulletin No. 42. Engineering Experiment Station, University of Illinois, Urbana, Ill. Illustrated, 173 pp., 6 x 9 inches.

Oil-Storage Tanks and Reservoirs. With a brief discussion of losses of oil in storage and methods of prevention. By C. P. Bowie. Department of the Interior, Bureau of Mines. Bulletin 155, Petroleum Technology 41. Illustrated, 70 pp., 6 x 9 inches.

Trade Catalogs

Unless otherwise stated, a copy of the publications listed below may be obtained free by addressing the manufacturer.

Coxe Stokers. Combustion Engineering Corporation, New York. Bulletin Cl. Pp. 21; 6 x 9 in.; illustrated. Views and diagrams of typical Coxe stoker installations.

Class "FP" Steam Engines. Ingersoll-Rand Co., Easton, Penn. Form 883A. Single-page flyer on this engine, which is of the horizontal center crank type with piston valves.

"Little David" Evaporator Tube Cleaner. Ingersoll-Rand Co., Easton, Penn. Form 888. Pp. 4; 8½ x 11 in.; illustrated. Describes "Little David" evaporator tube cleaning and other labor-saving pneumatic tools.

Sullivan Duplex Air Compressors. Sullivan Machinery Co., Chicago, Ill. Circular 58-B (second edition). Pp. 24; 6 x 9 in.; illustrated. Instructions for installing and operating classes "WI" and "WJ" belt-driven air compressors.

"Ideal" Tilting Crucible Furnace. Ideal Furnace Co., Chester, Penn. Booklet. Pp. 16; 5 x 8 in.; illustrated. Gives description, test data and features of coal and coke furnaces for melting copper, brass, aluminum, bronze and other metals.

Centrifugal Boiler-Feed Pumps. De Laval Steam Turbine Co., Trenton, N. J. Bulletin N. Pp. 4; 8½ x 11 in.; illustrated. Describes the De Laval combined steam turbine and centrifugal boiler-feed pump. Electric motor-driven units are also described.

Safety First Motor Switch Conduits. Crouse-Hinds Co., Syracuse, N. Y. Bulletin No. 1000 H. Pp. 16; 8 x 10½ in.; illustrated. Describes what the company calls the "last word in small motor switches." The ZY conduits afford protection against shock, withstand rough usage, and cannot be operated by accident.

Lakewood Trackless Haulage Systems. Lakewood Engineering Co., Cleveland, Ohio. Bulletin No. 25. Pp. 24; 8½ x 11 in.; illustrated. Describes the trucks, trailers and tractors developed by the Lakewood company to meet the need for the economical handling of freight and machinery parts in large plants.

CR 3105 Drum-Type Controllers. General Electric Co., Schenectady, N. Y. Folder. Pp. 6; 8 x 10½ in.; illustrated. These controllers are recommended for use with direct-current adjustable speed motors driving machine tools. They are provided with armature and field control points and are supplied for reversing or non-reversing service.

Medart Steel Lockers. Fred Medart Manufacturing Co., St. Louis, Mo. Catalog A-5. Pp. 16; 7 x 10 in.; illustrated. Quite a pleasing example of the printer's art is this little catalog describing the steel lockers and locker-room equipment manufactured by the Medart company. The excellent halftone illustrations convey better than text the quality of the Medart products, though construction details and a price list for the standard sizes of lockers are given. Mine officials contemplating the purchase of locker room equipment should by all means procure a copy of this catalog.

Industrial News

Charleston, W. Va.—The Sunset Mining Co., whose plant is in the New River field, has changed hands, V. P. Veazy, of Mt. Hope, having disposed of his interests to Charles Ash, of Glen Jean, W. Va.

New York, N. Y.—There was shipped from the Port of New York during April 7107 tons of anthracite, valued at $49,785; 3081 tons of bituminous, valued at $21,304, and 633 tons of coke, valued at $16,757.

Morgantown, W. Va.—The National Fuel Co., of this place, has contracted with the Willis E. Holloway Co., Cleveland, Ohio, for a complete tipple for its new mine at Flaggy Meadow, W. Va. The operation will produce 2000 tons daily.

Barbourville, Ky.—The Trace Branch Coal Co., which recently filed notice of an increase in its capital to $15,000, is now developing about 40 acres of property having a capacity of about 20 tons daily. R. Bassett Minton is president.

Cleveland, Ohio—The Willis E. Holloway Co., consulting and contracting engineers, have been awarded contract for complete steel tipple for the No. 3 mine of the Elm Grove Mining Co. at Triadelphia, W. Va. The tipple is to have a capacity of 2500 tons a day.

Whitesburg, Ky.—The coal operators of Letcher County, Kentucky, met at the Whitesburg Hotel on June 4 and organized themselves into the Letcher County Coal Operators' Association. J. Henry Hall, of the Whitesburg Coal Co., was chosen president and John F. Maurice, of the Ulvah Coal Co., secretary and treasurer.

Charleston, W. Va.—One thousand nine hundred and forty-nine injuries were reported and 1772 applications for compensation were received in the month of May by the State Workmen's Compensation Department. Sixty-one of the injuries proved fatal. Of the injuries reported 876 nonfatal and 50 fatal occurred in coal mines. One thousand five hundred and five claims were awarded.

Sussex, N. J.—The Lehigh & New England Railroad Co. has awarded a contract to Fairbanks, Morse & Co., 30 Church St., New York, for the construction of a large concrete coaling station in the lower section of its local yards. The new plant is estimated to cost in the neighborhood of $40,000, and coaling machinery of the latest type will be installed immediately upon completion of the construction work.

Birmingham, Ala.—At a recent meeting of the Alabama Coal Operators' Association the following officials were reëlected for the ensuing year: President, George B. McCormick, Pratt Consolidated Coal Co.; vice president, Charles F. DeBardeleben, Alabama Fuel and Iron Co.; secretary and treasurer, James L. Davidson. Executive committee: George G. Crawford, J. B. McClary, Walter Moore, A. H. Woodward and George F. Peters.

Birmingham, Ala.—The Railway Fuel Co. has increased its capital stock from $10,000 to $200,000. This company, which is officered by officials of the Southern Ry., is developing coal properties in Walker County, where work has been under way for several months, the mine being opened up to be equipped with modern tipple and washery facilities. The output from this operation will be used exclusively in the operations of the Southern Ry. system.

Louisville, Ky.—With approval of Wiley B. Bryan, Kentucky fuel administrator, the Jefferson County fuel administration has issued a new regulation under which a charge of 30c. a mile from yard to destination will be made for coal delivered by local retailers to consumers outside of the city limits. It was held that the 75c.-a-ton delivery allowance was unfair on long hauls and had resulted in city dealers, in many cases, refusing to accept orders.

Grafton, W. Va.—At the second annual meeting of the Grafton Coal Operators' Association, held here on Thursday, June 6, the following officers were elected: President, George S. Brackett, of Flemington, general superintendent of the Pitts-Vein Coal Co.; vice president, Thomas Murphy, of Austen, general superintendent of the Gorman Coal and Coke Co.; secretary and treasurer, W. J. Carnahan, general superintendent of the Deaker-Hill Coal Company.

St. Louis, Mo.—August A. Busch, president of the Anheuser-Busch Brewing Association, who is the principal owner of Nigger Hollow Mines No. 1 and 2 near French Village, Ill., operated by the St. Louis & O'Fallon Coal Co., in a statement given to newspapers asserting the loyalty of the Busch interests to the Government, says that the output of the mines, the capacity of which is more than a million tons a year, has always been sold at a price considerably below that fixed by the Government.

Toledo, Ohio—Activity in the lake trade still prevails at the Toledo docks of the various coal-carrying roads. During the week ended June 7 the Toledo & Ohio Central docks handled 71,000 tons as compared with 68,000 tons the previous week. The total handled since the opening of the season is 405,000 tons. The Hocking Valley docks during the week ended June 8 loaded 11,744 tons as compared with 126,841 tons the previous week, making a total of 731,580 tons since the opening of the season.

Buffalo, N. Y.—Members of the grain trade here have organized the Cadiz Coal and Lumber Co., with $300,000 capital stock. They have 700 acres of coal land near Cadiz, Ohio, which will produce an estimated 3,000,000 tons of No. 8 coal and which is covered with 3,000,000 feet of hardwood timber. The Government has given them an order for the lumber. The incorporators are H. A. Smith, C. J. Meyers and M. C. Burns, of Buffalo. Operations will begin soon. The coal is tributary to the Cleveland market naturally.

Columbus, Ohio—H. S. Riddle, of the Ohio Board of Administration, is again figuring on the proposition for the State of Ohio to own its own coal mines. The Ohio Board of Administration has charge of 22 state institutions and uses about a half million tons of coal yearly. Mr. Riddle reports that several attractive propositions have been made to the board recently by owners of coal lands in the Hocking Valley. Pending decision in the matter the board has taken no action toward buying its coal supply for next winter.

Indianapolis, Ind.—The new Indianapolis board of health expects to build at the city hospital a large concrete coal bin for the storage of coal for the winter. The bin will have a capacity of 1000 tons and the coal will be maintained under water so as to prevent combustion. This amount of coal will run the hospital only 60 days, but it is the expectation to use this supply only as a reserve to tide over a possible fuel shortage next winter. Last winter, on two or three occasions, it was feared that the hospital would have to close on account of being entirely out of coal.

New York, N. Y.—Preparations are under way whereby shipments of coal from Rochester (and possibly another point) to New York will soon be made on the New York Barge Canal. G. A. Tomlinson, general manager of the New York Canal Section of the Railroad Administration, made an inspection of the canal last week and has his plans under way. It is pointed out that by shipping coal to Rochester from the mines and dumping it into barges for shipment through the canal, a car can make four trips between the mines and the canal docks while it is making one trip from the mines to tidewater.

Moundsville, W. Va.—By utilizing 15 big trucks to haul coal from its Marshall County mines to the Riverside and La Belle mills, and from its Belmont County mines to the La Belle mills, L. L. Salomon, local manager of the Philadelphia & Cleveland Coal Co., estimates that one truck in a single day releases 20 coal-car days, or in other words, does the work of one coal car that it would take 20 days to do and that, therefore, 15 trucks means the release of 200 coal-car days every day they work. It is also estimated by Mr. Salomon that a week's haul by the company's trucks represents 4860 tons of coal hauled.

Columbus, Ohio—Rate increases in Ohio on coal shipments after June 25 will be increased in accordance with the announcement of Director General of Railroads McAdoo. The present rate from the Hocking Valley to Columbus is 80c. and the new rate will be $1. From the Hocking Valley to Toledo, Lima, Dayton and western and northern Ohio points the old rate was $1.15 and the new rate will be $1.45. From the Hocking Valley to Marion the old rate was $1 and the new rate will be $1.30. The rates from the Jackson field to all points, except Lima, will be the same as from the Hocking Valley. From the Pomeroy field the same rates prevail.

Columbus, Ohio—While in Washington last week to secure from the Railroad Administration some relief in the matter of car supply for Ohio wagon mines, James B. Dugan, of the Ohio Public Utilities Commission, was informed that so far from any more open-top cars being given to these small mines, the supply may be curtailed, as an order is contemplated by the Administration, postponing the requirements of such mines to those of mines with tipples. If this is done, Mr. Dugan declares that the wagon mines, whose production forms an important item to consumers in a considerable territory in central Ohio, will be put out of business completely, as the car supply is recognized as being inadequate to give all tipple mines a full supply.

Pittsburgh, Penn.—The Dravo Contracting Co. has announced it will operate its Neville Island plant as a separate department, to be known as The Dravo Contracting Co., Engineering Works Department. It has been manufacturing whirlers, steel towboats and barges for some time, and due to increased business has found it advisable to make this change. The concern has contracts for 33 towboats and barges, the majority of which are for use by the United States Government. In addition to this, it has a large number of orders for tower whirlers for handling material at shipyards. An entirely separate purchasing, accounting and engineering organization has been installed. J. D. Berg has been made vice president of the Dravo Contracting Co., in charge of the Engineering Works Department.

Springfield, Ill.—W. C. Hurst, vice-president and general manager of the Chicago, Peoria & St. Louis Railroad Co., has written to the mayor and commercial organization of every town on the line offering storage space for coal along the right-of-way to all who may need it. His motive, he says, is not only to help the Fuel Administration but to make business for his road at a time when coal can be hauled to the best advantage. His engines, he explains, can haul full loads of coal now, whereas in cold weather they can pull only one-half to three-quarters of a load. Besides, freight traffic is not so heavy now as it will be later, and his road has a maximum equipment available for coal transportation. He insists that the deterioration will be slight. The company has already, he says, begun to store coal for its own needs next winter. Responses are being received from the towns and he thinks that his campaign will have substantial results.

St. Louis, Mo.—J. D. A. Morrow, in charge of distribution for the Federal Fuel Administration, was the guest of the Fifth and Ninth Districts Operators' Association and the Missouri Retail Coal Dealers' Association at the Jefferson Hotel Tuesday evening, June 4, during a stopover on his way to Kansas City, and delivered an address in which he told them why St. Louis cannot have any anthracite this year and forecasted a coal shortage next winter. He explained that this was practically inevitable because even if the mines produced sufficient coal and the railroads were able to transport it, the movement would have to be consistent with the movement of other materials needed for the production of war essentials. In answer to a question he cleared up the uncertainty that has surrounded the railroad coal situation. The order that the railroads were to pay the same as other consumers meant, he said, that producers could ask the maximum Government price but could also sell at less than the maximum if they chose. He said the railroads would be required to distribute cars equally to all mines and that contracts for coal made by railroads since Dec. 29 were automatically abrogated. He explained that St. Louis could not have any anthracite because the difficulties of transportation necessitated giving it to the munitions-manufacturing districts of the East. In answer to a question of E. D. Nims, Chairman of the St. Louis Fuel Committee, he said that the railroads would be required to store for next winter to their full capacity and said that but for the dispute about what the railroads were to pay, which had caused the loss of three months time, millions of tons would now be in storage.

MARKET DEPARTMENT

Weekly Review

Slump in Both Anthracite and Bituminous—Question of Adequate Labor Supply Disturbs Hard-Coal Operators—Production Bureau to Stimulate Coal Output—Need of Conservation—Automobile Industry Receives Drastic Cut in Fuel Allotment

THE decrease in production of bituminous coal during the week ended June 1, owing to the observance of Memorial Day in the mines of the northern states, seems to accentuate the fact that only by full-time operation will the mines be enabled to furnish the minimum of 634,000,000 net tons of soft coal necessary to keep war industries going and warm the homes during the coming year. To secure this output it would be necessary to maintain an average weekly production of more than 12,000,000 net tons. This tonnage has not been produced in any single week during the history of the bituminous coal mining industry. In the week ended June 1 the output fell considerably more than one million tons below this average, only 10,774,000 net tons being mined.

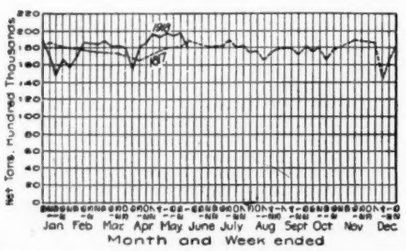
Anthracite production, too, suffered a decrease during the week ended June 1. Both the laying-off for the holiday and an inadequate labor supply contributed to keep hard-coal shipments down to 31,762 cars, a decrease of 8832 cars when compared to the anthracite shipments the preceding week. The labor question seems to be the main disturbing factor to maximum hard-coal production at the present time, and it is one that should receive the immediate attention of interested officials. Not only has the anthracite industry lost more than 32,000 men since we entered the war, but the draft is continually making further inroads. It is hard to see how the necessary quantity of anthracite can be produced with the labor force that is now available. By eliminating skilled miners from the draft, and suspending for the duration of the war the Gallagher bill (which prohibits the employment of miners underground unless they have had two years' experience in the mines of Pennsylvania), the situation would be helped materially.

It is evident, therefore, that two things are essential to a solution of the coal problem—intensive production and the strictest kind of conservation. The former has already received the recognition of the Federal Fuel Administration by the formation of a "production bureau," headed by James B. Neale, who has been acting as advisor to Mr. Garfield. It will be the duty of this bureau to do everything possible toward increasing the volume of anthracite and bituminous coal mined. The matter of conservation rests in large measure with the consumer, who must at all times exercise the greatest watchfulness in the manner in which he burns his coal. Industries not engaged in war work will have the utmost difficulty in obtaining coal in the future, the automobile manufacturers being the latest to have their fuel supply curtailed. By an order of the Fuel Administration the allotment of coal to this industry has been cut down to 25 per cent. of its 1917-1918 requirements.

So far as trade conditions are concerned, dealers are making deliveries as fast as they can and generally are bare of stocks. Demand for all grades of coal is greater than the supply. Lake shipments so far have been below expectations, though carrying capacity is plentiful.

COAL PRODUCTION

The observance of Memorial Day at the mines in the northern states caused production of bituminous coal during the week of June 1 to decrease 1,025,000 net tons, or 8.7 per cent. The output of soft coal (including lignite and coal made into coke) is estimated at 10,774,000 net tons as compared with 11,779,000 net tons during the week of May 25. The average per working day for the week ended June 1 is estimated at 1,796,000 net tons as against 1,966,000 during the preceding week and an average daily production during May, 1918, of 1,918,519 net tons. Although Memorial Day



was not universally observed, the curve showing production per working day has been based on 6 days in the week.

Preliminary estimates place production of beehive coke during the week ended June 1 at 612,000 net tons, a decrease of 51,000 net tons, or 7.7 per cent. compared with the week of May 25. The average daily production amounted to 102,000 net tons as against 111,000 net tons during the week preceding.

Beehive Coke—Beehive coke production in the Connellsville and adjacent regions declined slightly during the week ended June 1. The principal operators located in the Connellsville, Greensburg and Latrobe districts report production of 308,735 net tons, or 76.2 per cent. of their present rated capacity as against 77 per cent. during the week preceding. Out of total losses of 23.8 per cent., 19.4 per cent. was attributed to insufficient yard labor against 15.4 per cent. during the week of May 25 and 4.4 per cent. to all other causes as compared with 7.2 per cent. The same operators produced 140,100 net tons of coal operating at 44.6 per cent. of their present rated capacity.

Byproduct Coke—The production of byproduct coke during week ended June 1 again declined slightly and is reported at 87.7 per cent. of maximum capacity as compared with 88.5 per cent. during the week preceding.

Of the factors limiting production shortage of coal losses increased during the week from 2.6 per cent. to 2.8 per cent., labor shortage losses from 2.6 per cent. to 3 per cent., repairs to plants caused losses of 5.4 per cent. as against 4.9 per cent. and "no market" losses rose from 0.2 per cent. to 0.3 per cent. Losses attributed to all other causes declined from 1.2 per cent. to 0.8 per cent.

Material decreases in production for the week of June 1 are reported by Alabama, Minnesota, Pennsylvania, Tennessee and West Virginia. In Alabama and West Virginia the decrease in production is attributed to repairs to plants, in Minnesota to "no market" and other causes, in Pennsylvania to insufficient labor and in Tennessee to lack of byproduct coke.

Kentucky and Maryland are the only states reporting material increases, the former state attributing the improvement to repaired plants and the latter state to better labor conditions.

CARLOADS OF COAL ORIGINATING ON PRINCIPAL COAL-CARRYING ROADS

	Week Ended May 11	May 18	May 25	June 1
Bituminous shipments, 123 roads.	207,145	205,026	207,036*	188,864†
Anthracite shipments, 9 roads...	38,767	41,011	40,594*	31,762†

* Revised from last report. † Subject to revision.

Anthracite shipments during the week ended June 1 decreased 8832 cars, or 22 per cent.

BUSINESS OPINIONS

Marshall Field & Co.—The wholesale distribution of dry goods for the current week is very much ahead of that of the corresponding week in 1917. Road sales for both immediate and future delivery show a slight increase over those of the same period a year ago. Customers have been in the market in greater numbers than during the corresponding week last year. Collections are very good, being even larger than they were for the same week a year ago. The prices of domestic cottons are firm.

American Wool and Cotton Reporter—There is no definite prospect of any shortage of wool now, but on the other hand there is no bright outlook for civilian fabrics which require certain wools. The stand which the War Industries Board has taken should be enough to indicate that the supply of woolen cloth will not be overlarge for some time to come, and that conservation is much more necessary than it has been previously. The consumer will not feel any effect of the shortage for a long time, if anything like a reasonable policy be adopted.

Bradstreet's—Government domination of a myriad of lines of industry and trade and almost unanimously favorable crop reports are the two great outstanding features of the situation. Government commandeering of the iron and steel, wool and heavy leather outputs are accomplished facts, and further extension of its control of manufactured textiles and of food supplies and prices of same seem inevitable.

Great basic changes are therefore proceeding under the new and fast-moving monopolization of human activities, directly or indirectly, in the war. Man power is being taken up steadily and rapidly by the second draft, and the attraction of female labor into lines formerly monopolized by men is growing apace.

Dry Goods Economist—The most important development of the week is the prospect of relief to the raw-cotton price situation afforded by the Government report as to the condition of the growing plants. This is placed at 82.3 per cent., against 69.5 on May 25, 1917, and an average of 79 for the last ten years. The Government has not yet published its estimate of acreage, but there is every reason to believe that it will be unusually great. The only offset to this is the large number of negroes—nearly 30,000—who have been summoned to the colors from the cotton states and must respond during June, many of whom doubtless would otherwise be available for work in connection with the raising and gathering of cotton.

The Iron Age—In an order dated June 6, which no one in the steel trade fully understands, the War Industries Board has put in the hands of J. L. Replogle, Director of Steel Supply, the distribution of the entire iron and steel output of the country. Starting with the sweeping provision that no pig iron or steel products shall be shipped except under priority certificates, the order provides that after all priority requisitions have been filled producers may supply their customers if the latter are on a preferred list, which, as revised, is to be sent out later. Steel ingot production in May, unlike that of pig iron, shows a slight falling off from the April rate. In 27 working days, May 30 not being a steel works holiday, the output of companies which made 88 per cent. of the country's total in 1916 was 3,256,965 gross tons, or 120,628 tons a day, against 3,163,410 tons in April, or 121,670 tons a day. The May rate, estimating companies not reporting, would mean about 42,300,000 tons a year.

Atlantic Seaboard

BOSTON

New distribution plan announced. Elaborate system of checks devised. Receipts continue short. Trade much interested in probable effect on shipments. Losses during May due to various causes. Not enough emphasis upon "balanced production." Difficulty of policing any plan for distribution. Railroad fuel difficulties not yet solved. New England railroads feel the pinch on supply. Hampton Roads dumpings sag. Submarine menace causes slow movement. "Zoning" of smokeless coals a misnomer. Fuel authorities prepare the most rigid supervision yet of cargo disposition. Only coal to preferred requirements moving all-rail via Shippensburg. Continued alarm on the part of New England buyers. Renewed buying of anthracite steam sizes. Directions issued to favor New England destinations all-rail on domestic sizes. Water coal slows up materially. Continued comment on "allotment," but actual shipments decrease.

Bituminous—The news most interesting to the trade this week concerned the program for distribution recently given out by the Fuel Administration. The burden of deciding upon the disposition of what coal comes forward to any state is now shifted from district representatives to state administrators, following out the theory that those on the ground are better qualified to exercise this function. The order of preference designated by the War Industries Board is to be followed strictly. Railroad requirements and those of the Army and Navy and other departments of the Federal Government are to be cared for from Washington, at least in theory; all other needs, except in certain special cases, are to be met by state administrators. Jobbers are to be allowed to have coal running in their names, subject, however, to supervision by the state administrator who has jurisdiction over the port of discharge.

Meanwhile, bituminous receipts continue to show a marked falling off. The number of cars passing the gateways the first six days of June showed a total of commercial coal amounting only to 446 cars daily, a drop of 24 cars from the May average, which was the lowest for the year thus far. Railroad fuel, however, showed a slight gain, 121 cars daily having been received against the May average of 98.

There are many reasons advanced for the serious shortage in the volume of bituminous all-rail. It has been represented to be largely due to the large demand for bunker fuel at New York and at Philadelphia, but this alone would not have been sufficient. Neither is there any ground for talk of railroad congestion when much of the coal was diverted to the most congested area in the country, about Philadelphia, and the New England roads were not only clamoring for coal to haul but complained bitterly over their small receipts for supply purposes. The great obstacle from a New England standpoint was the Preference No. 1 list and the drastic way in which the Washington instructions were interpreted by the district representatives. This territory has a large number of preferred requirements, although in volume of coal used the needs are relatively small. Enormous industries in Pennsylvania were obviously entitled to preference, and it took no great effort on the part of anybody to get them on the list. Many important New England plants, however, are among the 10,000 or more who are represented in applications to the War Industries Board which have not yet been acted upon. It should be said that at the present rate of progress it will be several years before they are acted upon, and should this plan have been followed implicitly there would have been real disaster to many important industries and untold delays caused to the war program.

On other accounts the previous program had to be abandoned. Steel and rolling mills would have been favored with coal when the small plant in New England would have had to go without, although its output was just as necessary for war purposes, in many cases furnishing a part that was indispensable. Not enough emphasis has been placed upon "balanced production," and merely because coal requirements are relatively small is no reason for passing them over. In tons of material the output of Pennsylvania, for instance, is much larger, but in the number of men employed per ton of coal New England doubtless makes a better showing. This territory is working from 65 to 75 per cent. on war orders, and it is a keen realization of the necessity that work be kept going that so many officials high in the Government are trying to see to it that New England gets its share.

The submarine threatenings have a marked effect upon the movement of coal coastwise. For days at a time the ports have been closed, and there is talk of systematic convoy for all coal carriers. Such a practice would slow up deliveries and the efficiency of units now in use would be much impaired. The effect upon the volume of coal dumped at Hampton Roads, and indeed upon coal sent to the piers, is already considerable. No sooner did a few bottoms appear at the terminals than the tonnage of coal in transit at once fell off and opportunity was taken to supply Virginia hospitals and other local necessities on the line of the principal railroads and on connecting roads as well. Thereby a further possible increment to New England's budget was lost.

It develops that byproduct plants must now have certain arrears in tonnage made up, and by direction of the Fuel Administration several shippers are obliged to make allotments from tonnage that would ordinarily be sent to the piers for export and for New England. It further appears that while great efforts were made to "zone" Pocahontas coal east, away from the Western market, the 35c. price differential made the Western trade peculiarly susceptible, and through "permits" the actual tonnage of Pocahontas moving west is on a basis fully as large as last year. In that respect, therefore, the zoning plan was a misnomer.

While there is no operating embargo against shipments in open-top cars all-rail to New England via Shippensburg from the Baltimore & Ohio and the Western Maryland, there is in effect an order of the Fuel Administration that effectually prevents any but deliveries in box-cars and to preferred requirements. This only adds to the alarm of most buyers, who see little chance of relief in any direction. Manifestly, stocks were greater than supposed, or several large plants would have been shut down by June 10. The new distribution plan will give some encouragement, for it will be felt that a local fuel administrator will be much more competent to deal with real emergencies than an official 500 miles or more away. Renewed buying of anthracite steam sizes is also notable, a decided impetus having been given this trade within a few days. There is more discrimination between grades than was the case last winter, and many coals of demonstrated value suffer somewhat in finding a market through the wholesale abuses last winter of the term "screenings."

The trade is certainly relieved to find that the drastic method of distribution through district representatives is being supplanted by a better considered program. The idea that preferred consumers were to be "taken care of" before deliveries were to be allowed to come forward to any others was hopeless for the community at large.

Anthracite—For the first six days of June the average daily movement of domestic sizes all-rail was only 420 cars, a loss of 34 cars each day from the May average. Of this movement 26.6 per cent. was steam sizes, or a daily average of 152 cars. This also was below the May average.

Due to the submarine activity the anthracite shippers had instructions a week ago to increase deliveries all-rail to such New England points as ordinarily are served by water. It will be interesting to see to what extent the movement can thereby be increased.

There are few developments in the anthracite trade as a whole. Receipts by water have sagged to a remarkable degree, and there is increasing confusion over instructions from Washington as to distribution. Retail distributors are now disturbed over a new regulation requiring apartment houses to be furnished with bituminous rather than anthracite, although hitherto preferences for anthracite were regarded.

NEW YORK

Dumpings of anthracite at the local tidewater docks show slight decrease from previous week, while bituminous dumpings show large increase. Dealers and consumers anxious for coal. Producers look for action regarding mine workers going to war. Bituminous situation little changed. Demand continues strong.

Anthracite—The effect of the order of the Anthracite Committee of the Fuel Administration that, on account of the interruption to water shipments to points east of Boston, as large a tonnage as possible be shipped to points in New England west of and including Boston, and also that liberal shipments be made into the various New England States all-rail, has not, so far, been felt to any extent here. Dumpings at the various local docks for the week ended June 10 totalled 6522 cars, or 20 cars less than were dumped the previous week.

Dealers and consumers here are anxious as to receiving sufficient supplies to meet their needs. Receipts locally do not appear to have increased to any extent, and consumers are strong in their demands for coal. These demands are strongest in Brooklyn, where a majority of the consumers live in individual houses. A telegram received by the Brooklyn "Daily Eagle" from Dr. Garfield said that the Fuel Administrator expected coal production and distribution sufficient to prevent any domestic suffering or curtailment of essential industries, provided only that the public coöperate with the Administration in stopping thoughtless waste and using coal efficiently in summer as well as in winter.

However, there is much uneasiness among the trade and public because of the lack of deliveries, and this urgency is becoming more apparent as the time draws near for many persons to close up their homes for the summer.

Similar conditions exist throughout Long Island, most of which is supplied with coal from the New York tidewater. Fuel Administrator Hawkins, of Suffolk County, has announced that he has asked for and needs 200,040 tons of coal this year, an increase over the consumption of 1916 and 1917.

Early this week there were reports that a state fuel administrator was to be appointed shortly to succeed Albert H. Wiggin, who resigned several weeks ago. The appointment of Mr. Wiggin's successor has been urged by the trade, who believe that the position should be filled now.

Producers here believe that the time has now come when the authorities should take some action to prevent a further depletion of the working forces in the mines, if it is desired to keep production up to the present mark. It is intended to ask that all mine workers be placed in Class 5 of the draft call, otherwise it is pointed out it will be impossible to get out the coal necessary to meet the country's needs.

The order of William Potter, state fuel administrator of Pennsylvania, discontinuing shipments of anthracite to 29 counties of that commonwealth, is not expected to add anything to the tonnage allotted to this state.

Announcement has been made that plans have been nearly perfected whereby the city authorities will be able to obtain a reserve stock of coal with which to take care of the fuel needs of the poor next winter. All of the domestic coals, including pea, are scarce both for tidewater and line delivery. The trade is willing to take

whatever it can get in the way of tonnage. There is a good demand for the buckwheat coals. The larger of these is short. Rice is easier while barley moves freely. Prices on all are held firm.

Current quotations, per gross ton, f.o.b., tidewater, at the lower ports are as follows:

	Circular	Individual
Broken	$6.55	$7.30
Egg	6.05	6.80
Stove	6.30	7.05
Chestnut	6.40	7.15
Pea	4.90	5.65
Buck	4.45@5.15	4.80@5.50
Rice	3.90@4.10	3.80@4.50
Barley	3.40@3.65	3.00@4.00
Boiler	3.65@3.90	.....

Bituminous—The local situation shows no big improvement, either in supplies or in lessening of demand. While the dumpings at the local tidewater docks for the week ended June 10 show a total of 7569 cars as compared with 6393 cars for the previous week, an increase of 1176 cars, it does not indicate that the local trade received any more coal, as the demand from New England and nearby water points have increased considerably because of the interruption in shipments from the Southern ports.

Locally, commercial coals are scarce. Efforts of shippers to pick up a stray cargo or two have been failures. Bunker fuel is easy and shipping has not been delayed to any extent.

PHILADELPHIA

Anthracite retailers' receipts continue light. Resume agitation against basic year plan. New England preferential continued. Planning division of increased allotment. City wants 25 per cent. increase. Local zoning plan again considered. New ruling on consumers' orders. Buckwheat exemptions being felt. Bituminous supply continues in fair volume. Car supply good. Submarine activity discounted in tide shipments.

Anthracite—It has been another discouraging week from the retailers' standpoint which has made them more pessimistic than ever. Those who have suffered the most and received the least coal are those who in March, 1916, prudently filled their yards to capacity in order to care for their trade that spring, in the event of expected troubles in the mining region. As their receipts for the months of April and May that year were necessarily light, it is becoming more apparent that these buyers are now paying a penalty for their forethought. This year no dealer was furnished with more coal in April and May, more particularly by the big companies, than was purchased during the same period of 1916.

For June the sales agents are advising their customers quite frankly that owing to the heavy consignments to New England it is possible their quota will not be filled. In fact we have complaints from some, including the largest firms in the city, that their May proportion did not reach them. This is in strong contrast to what was expected, for in April a number received a little surplus and it was felt that this would be the case right through the season. However, the New England preferential instructions have been continued in force and it now looks as if this would be the case right into fall. It is known that at this very time the shipments to the Port Richmond piers are particularly heavy, and at times it looked as if a congestion might result, which is the only chance of the local dealer getting a little extra coal.

Until late in the week no definite policy had been announced as to the distribution of the excess tonnage of 18.25 per cent. over the 1916-17 tonnage as allotted to this state. It would appear that the state and city fuel authorities are not in entire accord with the Federal Distribution Committee as to its distribution.

Some of the largest retail buyers are disappointed because as yet no official announcement has been made that this city will receive 25 per cent. of the additional tonnage. There seem to be assurances emanating from the local distributors' offices that such a statement would be given out ere this.

The distribution committee is doing its utmost to meet the increased demand from this city, as is witnessed by their latest order in cutting off anthracite from 29 counties in the state, which are located in the heart of the bituminous district. The community most affected by this move is Pittsburgh in Allegheny County, as local operators have shipped quite a tonnage of anthracite to that city for years.

The German submarine activities for a while had a considerable effect on tide shipments here, to the extent that an increased shipment via all-rail had been ordered, which means more cars with the subsequent delays in returning the empties to the mines. It is not thought this will continue for any length of time, as it is felt that the present warlike activities off the coast will soon subside.

This week Chairman Lewis, of the city fuel administration, issued an order that is causing considerable comment. He calls the dealers' attention to the fact that as their allotment for the present coal year is based on their requirements he refuses to allow any further shifting of the orders of the consumers. In other words, where an order has been placed with one dealer it must not be cancelled and filled with another.

The state fuel administrator has made a cheering announcement to the retailers. Mr. Potter stated that the supply of anthracite domestic sizes of coal needed by essential industrial plants would be held back as long as possible to give householders the opportunity to lay in a reasonable stock. The only exception will be to plants working on war materials, and these must obtain the indorsement of the department of the Government for which they are working. In the same connection Mr. Potter again calls attention of all citizens to the need of the strictest economy in the burning of coal. It is understood that churches are to be allowed but two-thirds of their normal supply, and that other steps are about to be taken to insure more coal for domestic use.

The buckwheat exemption which the steam plants were required to procure from Washington is making its impress heavily felt in the steam trade. On applying for this exemption certain plants have been advised that it cannot be allowed and they must adapt their boilers to smaller sizes of coal. The great difficulty in this latter case is that the consumers do not know where to get the smaller sizes of fuel, as practically every company is sold up on these sizes

The prices per gross ton f.o.b., cars for line shipments and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken	$4 90	$6.05	Buckwheat	$3.15	$3.75
Egg	4.50	5 70	Rice	2 65	3.65
Stove	4.75	6 05	Boiler	2.45	3.55
Nut	4.85	6.10	Barley	2.15	2.40
Pea	3.45	4.35			

Bituminous—A good supply of coal continues to come in and the important plants are storing away quite a considerable tonnage. There continues, of course, to be much pressure on all sides for increased shipments, but it can be said that conditions are closely approaching the point of being satisfactory. While some shippers do not report the car supply as being as favorable as last week, yet there are others who report an improvement.

Operators were hardly more than just interested in the ruling cutting off anthracite shipments to soft-coal producing counties. They state that there would be no particular trouble in taking care of this increased local domestic business, and as a matter of fact took the stand that it belonged to them and expressed the wish that in normal times it would stay with them.

For a while this week during the submarine attacks off the coast nearby there was some tendency toward congestion of bunker fuel at the piers, but this has now practically been eliminated and vessel movement is now going on about as usual.

An interesting case was heard of this week where a big power plant had adopted the plan of screening all its bituminous ashes and burning the screenings. It is claimed that the results are most satisfactory, a carbon content of as much as 15 to 20 per cent. being obtained from the ashes.

BALTIMORE

Bituminous receipts here comparatively heavy, but there is much complaint against poor quality fuel. Anthracite dealers have troubles and also ask that freight-rate increase be suspended for coal.

Bituminous—Considerable soft coal for all purposes is arriving here, but all of it is not desirable coal by any means. Many rejections have been made recently from the pool on coal consigned to the Maryland fuel administrator. The officials here say that they are determined to have only good coal shipped into this zone. Probably Baltimore felt the condition worse than other points, as among the considerable amount of coal diverted here at the Cumberland gateway because of railroad congestion, improper marking or attempts to consign out of specified zones, was some that did not appear to come up to requirements and which was redestined here for further inspection. This coal in large quantity was thrown out of the pool and had to be cared for by the jobbing trade. Because of the fair amount of good coal to be had here at Government prices, it was not always easy to dispose of the less desirable kind at the same prices. The jobbers are still working for a reclassification, and many of those here expect to forward cost sheets to Washington shortly in the move for a revision higher of their profit margins.

Anthracite—The hard-coal men here are having many troubles. Receipts for April were below average on even a three-quarter supply basis, May was worse, and in June so far only one big shipper has held anything like up to average. The result is that while a few dealers have been able to handle a fair proportion of coal, many others have had so little fuel to distribute that their forces and equipment were practically idle on some days. A meeting was held with the city fuel committee of the state fuel administrator and predictions were made that unless some new plan of relief and more equitable distribution is established by the Government shortly that a number of dealers will have their efficiency as distributing agents seriously curtailed. Among other things a protest was sent to Washington against any move to increase the freight rates on coal before Sept. 1. A jump of 50c. additional a ton at this time, the retailers say, when the business is already under heavy stress, would be a mistake. The representative of the United States Coal Merchants' Association at Washington has been asked to present this view to the Fuel Administration and Director of Railroads McAdoo.

Lake Markets

PITTSBURGH

Better car supplies uncover more labor shortage. Market sales somewhat heavier. Not enough stocking.

There has been a slight improvement in coal production in the district. Car supplies are unsatisfactory in many instances, but on the whole are much better than a fortnight ago. The increased car supplies have uncovered more of a labor shortage, and the percentage of lost production ascribed to car shortage is decreasing while the percentage ascribed to labor shortage is increasing. This does not mean that the supply of labor has actually decreased, though if the condition were considered without thought, and particularly the figures shown in the weekly report of the Geological Survey, such an inference might be made. The aspect at the coal mine is that to determine the day's operations the cars for loading must be in sight, and the operator counts the cars that are waiting to be loaded rather than the men that are waiting to see what the day's operations are to be. If there were no cars at all, there would be no labor shortage disclosed, but if there is a 100 per cent. car supply, a shortage of labor is almost certain to be uncovered.

Lake shipments are proceeding with a considerable degree of smoothness. Calculations have been somewhat disturbed, however, by a prospect that the shipping season, with respect to coal, is to be shut off by formal decree about Oct. 1, instead of running to the end of lake navigation, and doubts are entertained whether sufficient coal can be moved by Oct. 1.

Sales of coal in the open market are somewhat more frequent, and a fair amount of this business is being handled by brokers who are still able to collect the commission from many customers. There is a moderate amount of stocking by large consumers, particularly byproduct coke producers, but not nearly so much as is considered necessary to avoid a shortage next winter when, at the best, transportation will not be so good as in the summer. The market remains quotable as follows: Slack, $2.10; mine-run, $2 35; screened, $2.60, per net ton at mine, Pittsburgh district, subject to 15c. brokerage allowed to be charged by brokers to customers.

TORONTO

Heavy demand for anthracite. Consumers anxious to stock up for winter. Dealers overwhelmed with orders. Increased prices anticipated.

Conditions in the coal trade show little change. The receipts of anthracite are quite inadequate to meet the heavy demand of consumers anxious to lay in their winter stock. Dealers are busy endeavoring to overtake orders in arrears, and some of them are refusing to accept new orders. The public appears to have become thoroughly aroused to the need of stocking up early in the season. Bituminous is in heavy demand with fair supplies. Prices

remain unchanged for the present, but an advance is anticipated shortly.

Quotations for best grades per short ton are as follows: Retail anthracite, egg, stove, nut and grate, $10; pea, $9, bituminous steam, $8.50; slack, $7.50; domestic lump, $10; cannel, $13; wholesale, f.o.b. cars at destination, three-quarter lump, unprepared, $6.11; prepared, $6.31; slack, $5.18.

BUFFALO

Jobbers get promises, not much else yet. Fair demand for bituminous. Anthracite running down. Car supply good.

Bituminous—Jobbers differ somewhat as to the demand. Many of them are doing a small business, both here and in Canada, but the consumer seems to be pretty well satisfied with the supply. In spite of the continued report that a shortage will appear at the end of the season, stocking is not very general, nor does it appear that conservation is being practiced.

The jobbers are taking heart, especially since the predictions and promises made at the convention, but actual business has not increased visibly of late. Still the feeling is better than it was. The efforts of the Fuel Administration to make a short supply go as far as possible and meet the greatest needs are becoming better understood. If the car supply continues good the trade may be able to distribute coal more freely and possibly get something out of it.

Prices appear to be entirely on Government basis here, in spite of reports of bonuses paid elsewhere. For Buffalo, by new schedule, they are $4.65 for thin-vein Allegheny Valley, all sizes; $4.45 for Pittsburgh lump; $4.20 for Pittsburgh mine-run and $3.95 for Pittsburgh slack, f.o.b. Buffalo.

Anthracite—The supply is not so liberal as it was, especially to the local trade. Much effort is made to keep up the lake shipments, though all the shipping agents are complaining. They can get lake tonnage enough, but vessels will not wait long, as the demand for ore carriers is active.

Reports are coming in from Canada that consumers of anthracite are buying bituminous now, sometimes up to 50 per cent. of their winter needs, though it is likely that they will buy as much anthracite as they can get at the same time. If the way they are clamoring for it here is an indication, they would buy several years' supply if they could get it.

It appears that country consumers are getting a better supply of anthracite than they did last summer. They do their own carting and are sometimes able to get a full supply on the asking. The distribution is not regulated exactly according to needs yet.

Anthracite shipments to the lakes are again confined to the larger ports, as most of the small ones are supplied for the time. The amount loaded for the week was 112,200 net tons, of which 65,500 tons cleared for Duluth or Superior, 38,000 tons for Chicago, 7300 tons for Milwaukee and 1400 tons for Port Huron. Freight rates continue firm at 48c. to Duluth, 55c. to Milwaukee, 60 and 65c. to Chicago and $1 to Port Huron.

DETROIT

Shrinkage in coal receipts continues. State fuel administrator and county representative clash. Lake trade lacks volume.

Bituminous—Though the daily average of coal receipts in the Detroit market in May fell below that of the first four months of the year, a further reduction in volume of shipments is taking place this month. Receipts for the first week of June are said to average about 420 cars a day. With so greatly curtailed a movement of coal into the city now, when conditions are perhaps the most favorable of the year for liberal shipments, jobbers and consumers view the outlook for next winter with apprehension, fearing there will be a shortage of coal that will result in much suffering for many people.

The disagreement between W. K. Prudden, state fuel administrator, and Edgar B. Whitcomb, his Detroit representative, who is chairman of the Wayne County fuel committee, reached an acute stage a few days ago, when Mr. Prudden, in a letter from Lansing made peremptory demand that Mr. Whitcomb resign. Mr. Whitcomb declined to do so and appears to have the support of the coal committee of the Detroit Board of Commerce. The immediate cause of the strained relations was the attitude of Mr. Whitcomb and his associates on the Wayne County committee in opposing as too low a $2.50 a ton margin, allowed Detroit dealers by Mr. Prudden for domestic coal delivered through the summer. Coal men say there has been a lack of harmony between the state and the local fuel administrations for several months.

Anthracite—Shipments of anthracite coming into Detroit are far short of the needs of domestic buyers, and few of the consumers have been able to get delivery of anthracite for next winter's needs. While demand from the household consumers continues active, there is no sign of improvement in supply. Efforts are being made through the Detroit Board of Commerce to obtain a larger allotment of both anthracite and bituminous.

Lake Trade—Movement of coal over the lake routes is disappointingly light. With lake cargo coal prices fixed by the Federal Fuel Administrator late in the week, shippers and vessel owners are hopeful a larger volume of shipments will be delivered at lake loading docks from now on, making possible an early finish of coal shipments to the Northwest. So far shipments have been much below expectations though carrying capacity is plentiful.

COLUMBUS

Activity prevails in the Ohio coal trade. Lake requisitions are large, and the same is true of the demand from steam and domestic users.

Reduced car supply and growing labor shortage in several mining districts of Ohio is reducing the output materially. As a result the records of production are falling behind, and it is estimated that the shortage during May was about 1,000,000 tons. But this state of affairs is expected to be remedied in part, and it is believed that under coöperation between the railroads and the Federal Fuel Administration an increase in the output will be noted soon. Demand for all grades is strong, and the Lake trade is especially active. The tone of the market is generally satisfactory.

The Lake trade is now absorbing a large tonnage, variously estimated from 50 to 70 per cent. of the entire production of Ohio mining fields. The remainder of the tonnage is distributed among steam users and the domestic trade. The vessel movement is good and with it the ore movement is growing. Lake trade is expected to be pushed without the use of a Lake priority order, although shippers would not be surprised to learn of a priority Lake order by mid-season. Reports show that the tonnage to the Lakes is about 1,000,000 short of anticipations earlier in the season.

The domestic trade is active in every respect. Dealers are placing orders both for immediate and later shipment. Their reserve stocks are generally depleted, and they have not sufficient supplies to take care of all business booked. Pocahontas is a scarce article in the local trade. There is considerable West Virginia splint on the market, however, and New River coal is also being offered. The main supply for domestic purposes is coming from the mines of the Hocking Valley, Pomeroy and Crooksville. There is a slack in the demand for Jackson lump. "Fuel Week" caused an appreciable increase in the domestic demand.

The steam business is still one of the best features of the industry. Large steam users are endeavoring to stock up to guard against an emergency and consequently they are buying more than current needs warrant. The smaller users are following the example of the larger consumers whenever they have available storage space. There is little extra mine-run or screenings on the market, as it is readily absorbed.

CINCINNATI

Storage demand continues at a heavy rate, and dealers are unable to take care of orders. Improvement in transportation conditions is noted and may help the situation.

With a demand for coal which breaks all records for this time of the year, the trade is still running behind on deliveries, with no immediate prospect of catching up with its orders. The retail trade has been compelled to adopt the expedient of numbering its orders and notifying its customers that delivery will be made as their numbers are reached, and at prices then prevailing. Receipts are reported as somewhat improved during the past week, in spite of the growing volume of the movement to the lakes, which normally takes the bulk of the coal going through this gateway during the summer season. This movement, in fact, is expected to be the principal obstacle to the local demand being fully satisfied during the summer, inasmuch as it is the policy of the Fuel Administration, as established last season, as well as the natural policy of the operators, to move coal forward to the Northwest while the lakes are open for navigation. Dealers who look ahead, therefore, are still uneasy over the possibility that they will not be able to secure enough coal during the summer to satisfy the demands of local consumers. However, more coal than usual has already been placed in storage, and to that extent the possibility of a shortage next winter has been disposed of.

LOUISVILLE

General demand for all grades of coal greater than supply. Eastern Kentucky coal scarce in Louisville due to heavy gas demand. Domestic stocking heavy.

A prominent coal jobber in discussing the situation said: "There are easily orders to be had for one hundred domestic lots of eastern Kentucky coal for one that is being filled. Gas, run-of-mine and domestic coal are all in big demand. Domestic consumers are buying steam coal even at this season. There is practically no gas coal to be had, as the mines are sold up."

A western Kentucky operator said: "The draft has interfered with us considerably through breaking up our clerical organizations. The labor situation is critical, and due to the shortage of cars we are losing many men, who are going to farming. The car supply at present is about 50 per cent. of requirements. The demand is good and all grades are selling easily, but we haven't the production necessary under existing labor conditions."

In eastern Kentucky the mines at present have about a 75 to 85 per cent. car supply, which with a full supply of labor would be reduced to about 50 per cent. Cars are not making the usual mileage as they can't be loaded out fast enough with the short labor supply, and this has increased the car supply, but not the production.

BIRMINGHAM

Troubles in local market all center around the short coal supply. Inquiries for domestic and steam are holding up well in excess of available tonnage. Output averages around 75 per cent. normal, due to lax working conditions, and, in a measure, labor shortage.

The complaint in local trade circles is almost totally centered on the shortage of coal to supply the demand for both domestic and steam product. The cause of this shortage is attributed almost wholly to the indifference of mine workers to the situation and the dire need for 100 per cent. efficiency in coal production. More labor could unquestionably be used to advantage at many operations, but there is little or no hope for betterment. Every measure is being taken to induce the organizations at the mines as now constituted to refrain from laying off from one to three days per week and work steadily at least five and one-half days, and the success of such efforts would result in a wonderful improvement in the coal supply. The output has been gradually dropping off for the past several weeks, and unless the situation is speedily retrieved the 1918 production will fall under that of 1917.

Consumers will face an increase of 15c. per ton in the delivered price of coal on and after June 25, when new freight rates are effective. The demand for steam coal from Georgia territory slackened slightly during the past week, due to a more liberal supply being received from the Kentucky-Tennessee fields, but inquiries from the immediate district and within the state have shown no diminution. Calls for lump coal are strong and insistent from every section of the zone. The retail trade is good and deliveries are almost on a par with receipts at local yards.

Coke

CONNELLSVILLE

Connellsville output unchanged for six or seven weeks. Prospects of more coal production but perhaps less coke. Screenings from dumps bring better prices.

Production and shipments of Connellsville coke continue at about the same rate as for six or seven weeks past, about 340,000 tons a week. Shipments of Connellsville coal, for byproduct coking, have increased a trifle. The blast furnaces are not fully supplied with coke as yet, but this desired condition is now nearly attained. Few furnaces actually in blast are suffering from lack of coke, but the majority are unable to accumulate any stock as a margin of safety. Several furnaces tributary to the Connellsville region are out of blast because there is no assured supply for them.

From the outlook it seems improbable that there will be any material increase in the output of Connellsville coke, and if the blast furnace industry gets more coke in

future it will be through the medium of the byproduct oven. The probability is that as a large number of byproduct ovens are completed in the next few months the production of Connellsville coke will decrease, although the production of Connellsville coal, for byproduct coking, may increase in greater ratio.

There will be scarcely any change in the alignment of contracts over July 1. A few contracts that were to expire June 30 have been renewed, but they were merely contracts that called for a regular supply at the going price. The market remains quotable at $6 for furnace, $7 for foundry, 72-hour selected, and $7.30 for crushed, over 1-in., per net ton at ovens. The industry of screening the old dumps in the region is expanding, and as the contractors doing the work are particular about the product, they are selling the screenings at still higher prices. When this industry first appeared, a couple of months ago, the screenings brought about $4, but now they are sometimes bringing as high as $6.50. The Government limit would be $7.30, as the regulations are construed.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended June 1 at 343,020 tons, an increase of 2920 tons.

Buffalo—The consumers of coke of all grades are complaining of shortage and are having difficulty in getting what they need, but they have not shut down and probably will not need to, for there is some to be had as yet. The jobbers as a rule get only the refuse breeze coke, but they can sell it for steam-making as fast as it appears. One jobber reports shipping 10 cars to New Hampshire lately. Iron ore comes in liberally. The amount received here to the end of May was 802,210 gross tons, as against 548,299 tons to the same time last season.

Middle Western

GENERAL REVIEW

Production insufficient to take care of the demand. Many dealers have orders that will keep them busy far into the fall.

An alarming condition prevails in the coal-producing sections due to the constant drain upon the man-power by the army draft. In some sections operators are badly handicapped for men to drive motors, and they also have lost heavily of their mule drivers and trackmen. The fact that good drivers are scarce and hard to get in normal times would be sufficient evidence of the seriousness of the present situation, when almost 50 per cent. of this class of labor has been drafted.

Tonnage produced during the past week has shown an improvement over the previous week, with an average of 77 per cent. equipment supply. In some sections more cars were available than could be loaded, while in other localities many hours were lost owing to lack of cars.

CHICAGO

Demand still heavy for prepared coal. Screenings moving slowly at an off figure.

There is no let-up in the demand for prepared coal produced in Illinois and Indiana, and many operators would be able to operate their mines to full capacity if they did not take another order in six months. Particularly is this true of miners in Saline, Williamson and Franklin County, Illinois. Central and northern Illinois screenings have been a drug on the Chicago market for the past week. Indiana fine coal has also been selling slightly off.

The curtailment of anthracite has been helpful to Illinois mines, and the fact the public now realizes that no Eastern bituminous can possibly reach this market makes a market situation that is far in excess of anything ever heretofore dreamed of.

Quotations in the Chicago market are as follows, per net ton f.o.b. cars at mines:

	Williamson and Franklin	Saline and Harrisburg	Fulton and Peoria	Springfield	Carterville	Grundy, La-Salle, Bureau and Will.
Steam lump	$2.55@2.70	$2.55@2.70	$2.95@3.10	$2.55@2.70	$2.55@2.70	$3.25@3.40
Domestic lump	2.55@2.70	2.55@2.70	2.95@3.10	2.55@2.70	2.55@2.70	3.25@3.40
Egg or furnace	2.55@2.70	2.55@2.70	2.95@3.10	2.55@2.70	2.55@2.70	3.25@3.40
Small egg or nut	2.55@2.70	2.55@2.70	2.95@3.10	2.55@2.70	2.55@2.70	3.25@3.40
Stove	2.55@2.70	2.55@2.70	2.95@3.10	2.55@2.70	2.55@2.70	3.25@3.40
Chestnut	2.55@2.70	2.55@2.70	.....	2.55@2.70	2.55@2.70	3.25@3.40
Pea	2.55@2.70	2.55@2.70	.....	2.55@2.70	2.55@2.70	.....
Washed egg	2.75@2.90	.....	.....	2.75@2.90	2.75@2.90	3.45@3.60
Washed stove	2.75@2.90	.....	.....	2.75@2.90	2.75@2.90	3.45@3.60
Washed nut	2.75@2.90	.....	.....	2.75@2.90	2.75@2.90	3.45@3.60
Mine-run	2.35@2.50	2.35@2.50	2.75@2.90	2.35@2.50	2.35@2.50	3.00@3.15
Screenings	2.05@2.20	2.05@2.20	2.35@2.50	2.05@2.20	2.05@2.20	2.75@2.90
Washed slack	2.05@2.20	.....	.....	2.05@2.20	2.05@2.20	2.75@2.90

MILWAUKEE

Fuel administrators disturbed over the outlook for an adequate supply of coal. Efforts being made to accelerate Lake shipments. Consumers warned of a prospective shortage of anthracite.

Fifty-nine cargoes of coal, aggregating 449,563 tons, were received at Milwaukee during the month of May. Of this amount 85,066 tons were anthracite. During the first ten days of June the receipts amounted to 164,430 tons, of which 22,497 tons were anthracite. This is not a bad showing, but the fact that the docks were bare at the opening of the present season, whereas last year there was a goodly amount of anthracite held over, makes those having the fuel supply in hand somewhat nervous. State Fuel Administrator Fitzgerald is fearful that this part of the country will receive only two-thirds of the usual supply, and he has gone to Washington to stimulate the coal movement to the Northwest if such a thing is possible.

Consumers in the city and throughout the state are being warned that they may be forced to resort to soft coal to the extent of at least one-third of their regular allotment. Operators of power plants are also being notified that they will have to practice the strictest economy in the use of fuel. Mr. Fitzgerald will appoint an advisory engineer whose duty it will be to check all needless waste of fuel in power plants. It is figured that a saving of from 10 to 20 per cent. can be made by this means.

Notwithstanding that a fair amount of anthracite has been received thus far, only one company in Milwaukee is making deliveries of this grade of coal. The other yards are holding back until prices have been fixed by the Government. Just as soon as the price schedule has been received Mr. Fitzgerald says deliveries by coal dealers will be made compulsory. The books of small coal dealers are filled with orders, which they are unable to take care of because the dockmen are holding the coal from the market.

The steamer W. B. Davock unloaded 7000 tons of hard coal in 8 hours and 40 minutes at Sheboygan, Wisconsin.

ST. LOUIS

Car supply improved and a slight improvement in transportation. Carterville and Duquoin shipments light, Mt. Olive normal, and Standard overproduction continues. Domestic demand continues good, with light steam buying. Outside coals practically shut out from this market entirely.

The market at the present time continues without much change. There has been an improvement the past week in the car supply on all lines in all fields, due perhaps to the fact that transportation shows considerable improvement. There are quicker deliveries on coal from all fields than there have been for some time past.

In the Carterville field a heavy tonnage is being taken for railroad purposes. This, in the estimation of large buyers and the public in general, is not a proper procedure, for this high-grade coal is hauled by the railroad through the Standard and Mt. Olive fields for railroad purposes when the Standard and Mt. Olive coal would probably fill the bill to the same extent. Carterville coal is more valuable for domestic and other purposes than for railroad fuel, and the feeling on the part of the public is that the proper authority has not been exacted in compelling the railroads to take the kind of fuel that is best adapted for them.

The same condition prevails in the Duquoin district. The car supply is much better, but the labor problem is going to be a serious one shortly, with the draft making inroads. The month of June will see a decreased tonnage in all mines in the entire field on account of the draft.

The Mt. Olive field continues normal. The car supply is good, movement is fair, and the labor supply, while not all that could be desired, is maintaining a good tonnage at all mines. The demand for this coal is about equal to the supply at this time.

The Standard field continues to have an over-production. There is no market for screenings, which are down as low as $1.40. Mine-run is going at about $1.90 to $2 and lump coal is as low as $2.20, whereas the Government maximum is $2.55. The other miscellaneous sizes correspond, and the operators will not push production because it means the fixing of lower prices. In the face of this there comes an insistent demand daily from users in western Missouri outside of the Illinois zone for this same coal.

The railroads are not buying. They are hauling Carterville and Duquoin coal through the Standard field, where the mines are idle and where unbilled coal remains on track, and the Carterville mines are almost 100 miles farther away than the Standard field mines.

A few straggling cars of anthracite continue to come through, but this will all be shut off after this week. There is practically no Arkansas coal coming in and the local market is trying to load up on coke. The prevailing market is per net ton f.o.b. mines:

	Williamson and Franklin County	Mt. Olive and Staunton	Standard
6-in. lump	$2.55@2.90	$2.55@2.70	$2.55@2.70
3x6-in. egg	2.55@2.90	2.55@2.70	2.55@2.70
2x3-in. nut	2.55@2.90	2.55@2.70	2.55@2.70
No. 2 nut	2.55@2.90	2.55@2.70	.....
No. 3 nut	2.55@2.90	2.55@2.70	.....
No. 4 nut	2.55@2.90	2.55@2.70	.....
No. 5 nut	2.05@2.20	2.05@2.20	.....
2-in. sizes	2.05@2.20	2.05@2.20	.....
2-in. lump	.....	.....	2.20@2.40
3-in. lump	.....	.....	2.20@2.40
Steam egg	.....	.....	2.20@2.40
Mine run	.....	2.35@2.50	2.00@2.20
Washed:			
No. 1	2.55@2.90	2.55@2.90	.....
No. 2	2.55@2.90	2.55@2.90	.....
No. 3	2.55@2.90	2.55@2.90	.....
No. 4	2.55@2.90	2.55@2.90	.....
No. 5	2.05@2.20	2.05@2.20	.....

Williamson & Franklin County rate is 87½c. Other fields, 72½c.

SEATTLE

Greater demand to be made for Washington coal, and shortage in fall and winter predicted unless fuel is stored during summer.

Though the State Fuel Administration has reports showing that the mines of Washington could produce 1,500,000 more tons of coal during the year than in 1917, it is seriously questioned whether or not this record will be made. Unless it is made there will be a serious shortage, for it is estimated now that the increased demand upon Washington mines will total 1,250,000 tons during the year. The consumption last year was 4,161,000 tons, and the estimated consumption this year is 5,411,000 tons, with an estimated production of 4,600,000 tons.

The coal operators will have to overcome a labor shortage already existing and likely to become worse if there is no coal buying during the summer months. Already the United Mine Workers of America, District No. 10, report that during one week last month 500 members went into the shipyard work as assuring steadier employment. The crews of many of the Washington coal mines are bein scattered, and it is going to be a problem to secure enough men when fall demand begins.

The fact is, coal operators, railroad officials and the Fuel Administration agree that the West gradually is being drained of its supply of freight cars to supply Eastern demands. If the cars were in service here, it is pointed out, they could not be loaded with goods destined to Eastern lines. Since the cars are not in use in coal service they are being taken for other shipments, and once they reach an Eastern line the chances of their return grow slim.

Washington coal mines last year had little real responsibility beyond supplying a part of this state's requirements. During the coming year it will be asked to not only supply its own needs but those of Oregon and Alaska, with incidental supplies for other territory. Washington has never had to store coal. Under the most severe circumstances the state has managed in some manner to get fuel from near-by mines before it suffered. For that reason, the mines, large dealers and big consumers have not provided storage facilities. The coal business of Seattle is split up among 104 retailers, exclusive of teamsters. Because of the shortage in storage room it is insisted by those who are handling the fuel problem that every bit of room will have to be used to provide against the winter's demands.

Practically all plants now burning oil will have their supply withdrawn by November, only a few war-essential industries being permitted to continue using oil.